

since 1995

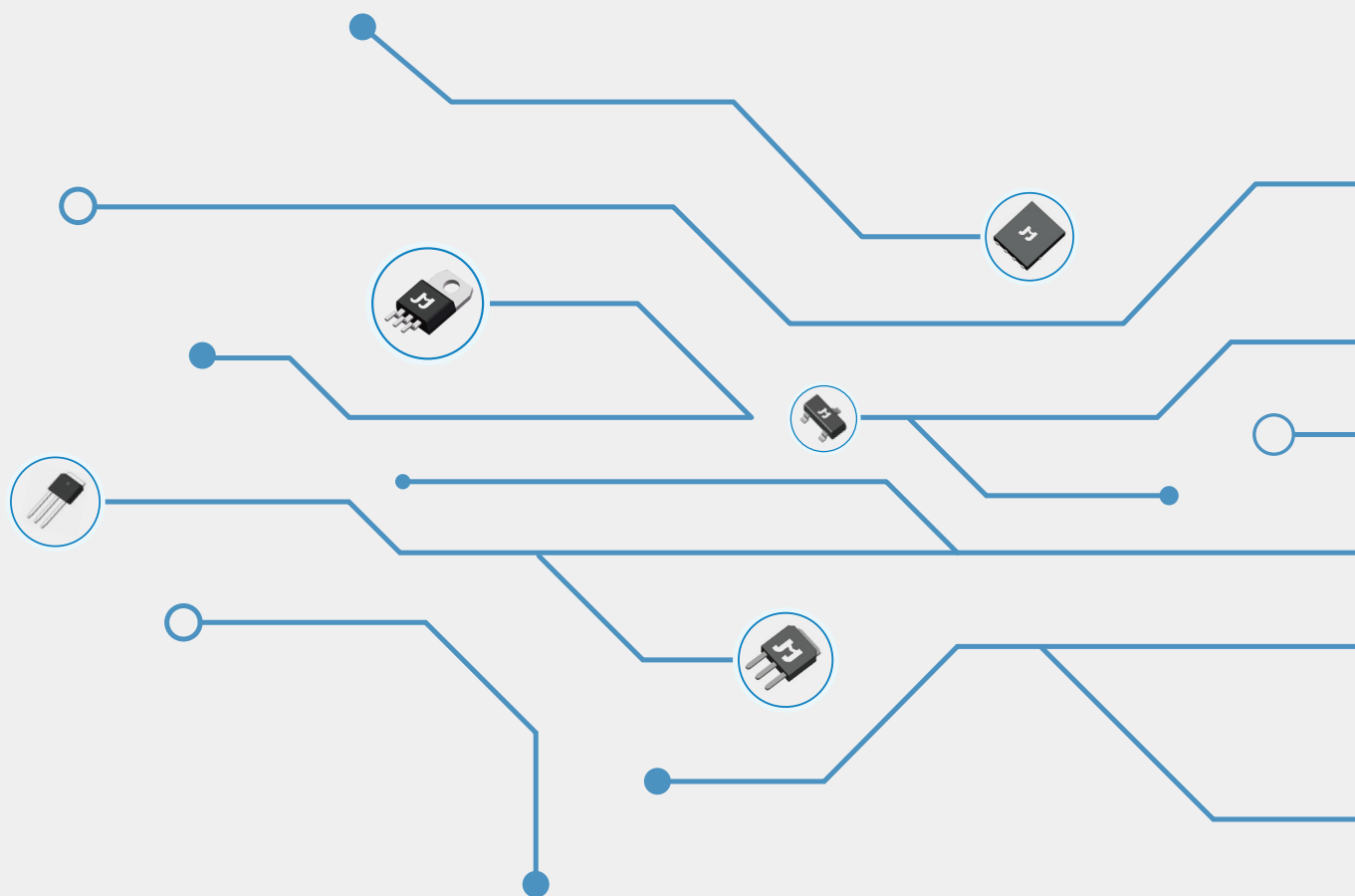


专业半导体器件制造商

Integrated Device Manufacturer (IDM) of Semiconductor Devices

## 金属氧化场效应晶体管产品指南

MOSFET Handbook 2022 v1.0



股票代码 Stock Code 300623

# 江苏捷捷微电子股份有限公司

Jiangsu JieJie Microelectronics Co., Ltd.

## 关于捷捷 COMPANY PROFILE

江苏捷捷微电子股份有限公司创建于 1995 年,是集芯片研发、芯片制造、封测和销售为一体的江苏省高新技术企业。2017 年 3 月 14 日于深圳创业板上市,股票代码 300623。捷捷微电是国内领先的高品质功率半导体器件 IDM,自 2017 年起便一直位列在中国半导体行业协会年选的「中国半导体功率器件十强企业」。

主导产品为晶闸管(单、双向可控硅)、MOSFETs (SGT、沟槽、平面、超结等工艺)、低结电容放电管等各类保护器件、高压整流二极管、功率型开关晶体管。作为晶闸管龙头企业,捷捷微电 2020 年晶闸管营业收入为国内同行第一、全球第三,而且国产替代进口市占率约 50%。

中/低压 MOSFETs 技术达国际一线大厂水平,其中  $V_{BR(DSS),Min}$  低于 200V 的多系列 JSFET® SGT MOSFET 与业界龙头第五代产品的性能不相伯仲。公司已搭建资深车规级团队,涵盖芯片/封装/产品/测试/制造/质量/应用等。在启东、南通、无锡和上海拥有四大研发中心,大力推进人才建设与技术创新,积极引进海内外人才。江苏启东、南通两大制造基地全力打造「制造优势」和「本土化自主化」。

所有生产设施均先后通过 ISO 9001:2008 和 IATF 16949 质量管理体系、ISO 14001:2004 环境管理体系、ISO 45001 职业健康安全体系、QC 080000 有害物质过程管理体系等认证。制造的产品符合 UL 电气绝缘性要求, RoHS 环保要求、REACH 化学品注册、评估、许可和限制性要求、无卤素等要求。

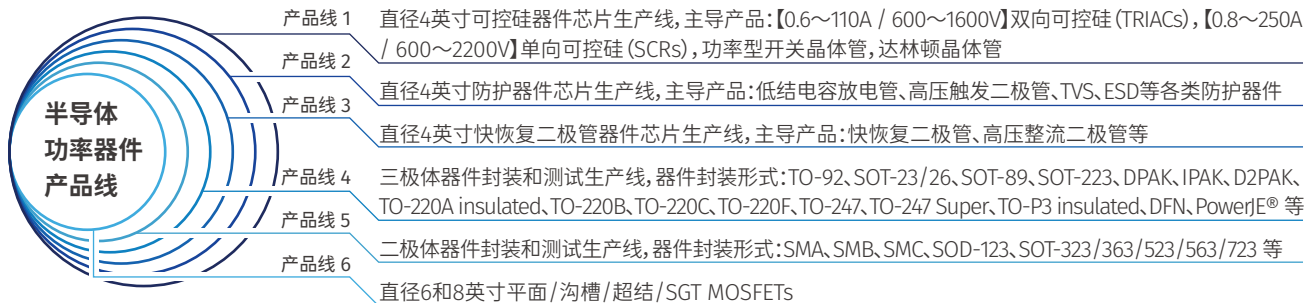
In year 1995, Jiangsu JieJie Microelectronics Co., Ltd. (a.k.a. JJM) was founded as a semiconductor IDM (integrated device manufacturer) headquartered in Jiangsu province. Its operation include research & development of silicon dies, wafer manufacturing, package assemblies, and testing (manufacturing, verification, long-term qualification) of packaged devices. On March 14, 2017, JJM was listed (stock code: 300623) on the ChiNext board of Shenzhen Stock Exchange. JJM was awarded the Top 10 Enterprises for Power Semiconductor Devices in China ever since.

Currently, the main product portfolio of JJM comprises of the following semiconductor devices: uni- & bi-directional thyristors, MOSFETs of split-gate type (SGT) and of trench type and of planar type and of super-junction type, protection devices including electro-static devices (ESDs) with low input capacitance and transient voltage suppressor (TVS) and varistors with low junction capacitance, high-voltage diodes and rectifiers, power transistors etc. Based on the revenue achieved in year 2020, JJM was ranked #1 for thyristor devices in China (replaced ~50% of the non-domestic competition) as well as #3 for thyristor devices worldwide.

Many of the JSFET® SGT-type MOSFET devices with  $V_{BR(DSS),Min}$  below 200V offer performance similar to those from the tier-1 vendors across the world. Within JJM, there exist special teams comprising of experts with multi-year global working experience to take care of auto-grade products and related tasks covering: die R&D, assembly, product definition, testing, manufacturing, quality and application support. The four Product R&D Centers at Qidong, Nantong, Wuxi and Shanghai continue to bring in talents with experience on power semiconductors from all over the world. Production facilities are located at Qidong & Nantong cities of Jiangsu province, while their mission are to achieve manufacturing excellence, localization and full autonomy on all matters concerning power semiconductor devices.

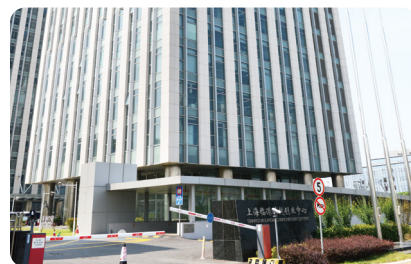
At JJM, leading processes and systems are in place to govern all key disciplines: a) ISO 9001:2008 and IATF 16949 certification for quality management; b) ISO 14001:2004 certification for environmental management. To facilitate the global reach of customers' products in which JJM's products are embedded, the relevant products from JJM are UL certified (e.g. high-voltage rectifiers and TVS), RoHS and REACH complaint, whichever applicable.





<b>19</b>	<b>97</b>	<b>1</b>	<b>19</b>	<b>41</b>
发明专利	授权实用型专利	外观专利	江苏省高新技术产品	SGT MOSFET 相关专利

以捷捷微电为依托的江苏省工程技术研究中心,负责公司新产品、新工艺技术开发及改造。在自主研发的同时,加强与企业及科研院所的合作,大力开发具有自主知识产权的关键技术,形成自主的核心技术和专有技术,加快科技成果产业化步伐。积极布局专利攻防体系,在功率半导体领域共获得授权专利117项,其中发明专利19项,授权实用型专利97项,外观专利1项。公司拥有江苏省高新技术产品19项。过去一年,就 SGT MOSFET 领域已申请及批准的相关专利超过41项。为实现半导体系列产品技术领先战略提供技术储备和支撑,捷捷微电先后成立了七家子公司:



**捷捷微电(上海)科技有限公司**

Jiejie Microelectronics (Shanghai) Technology Co., Ltd.



**捷捷半导体有限公司**

Jiejie Semiconductor Co., Ltd.



**捷捷微电(深圳)有限公司**

Jiejie Microelectronics (Shenzhen) Co., Ltd.



**捷捷微电(南通)科技有限公司**

Jiejie Microelectronics (Nantong) Technology Co., Ltd.



**捷捷微电(无锡)科技有限公司**

Jiejie Microelectronics (Wuxi) Technology Co., Ltd.



**江苏捷捷半导体新材料有限公司**

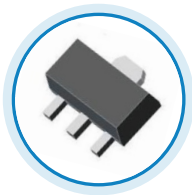
Jiangsu Jiejie New Semiconductor Materials Co., Ltd.



**江苏捷捷半导体技术研究院有限公司**

Jiangsu Jiejie Semiconductor Technology Research Institute Co., Ltd.

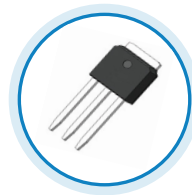
## ▶ 插件封装 THROUGH-HOLE PACKAGES



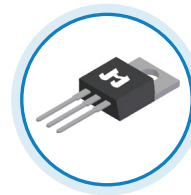
SOT-89-3L



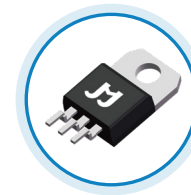
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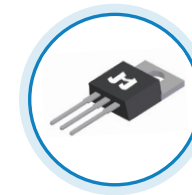
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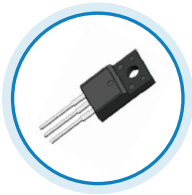
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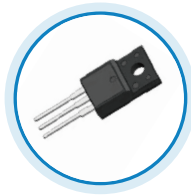
TO-220AS-3L



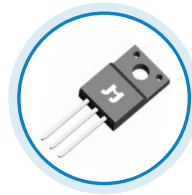
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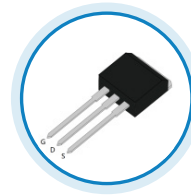
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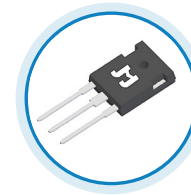
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TO-220FP-NL



TO-262-3L

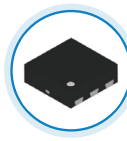


TO-247-3L

## ▶ 表贴封装 SURFACE-MOUNT PACKAGES



DFN1006-3L



DFN2020-6L



DFN3333-8L



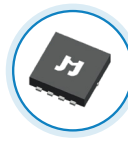
W-DFN3030-8L



DFN5060-8L



DFN8080-4L



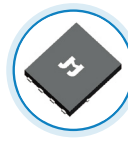
PDFN3x3-8L



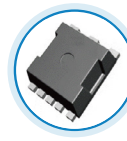
PDFN3x3-8L-D



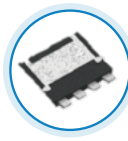
PDFN5x6-8L



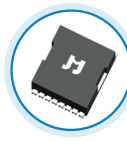
PDFN5x6-8L-D



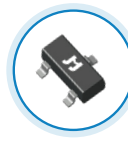
PowerJE®7x8  
sTOLL-comp.



PowerJE®8x8  
sTOLL-comp.



PowerJE®10x12  
TOLL-comp.



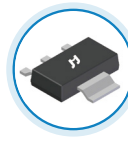
SOT-23



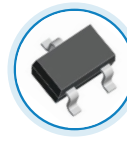
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SOT-23-6L



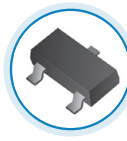
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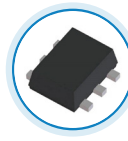
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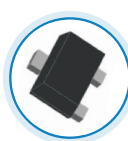
SOT-363-3L



SOT-523-3L



SOT-563-6L



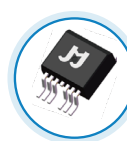
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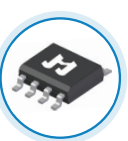
TO-252-3L



TO-263-3L



TO-263-7L



SOP-8



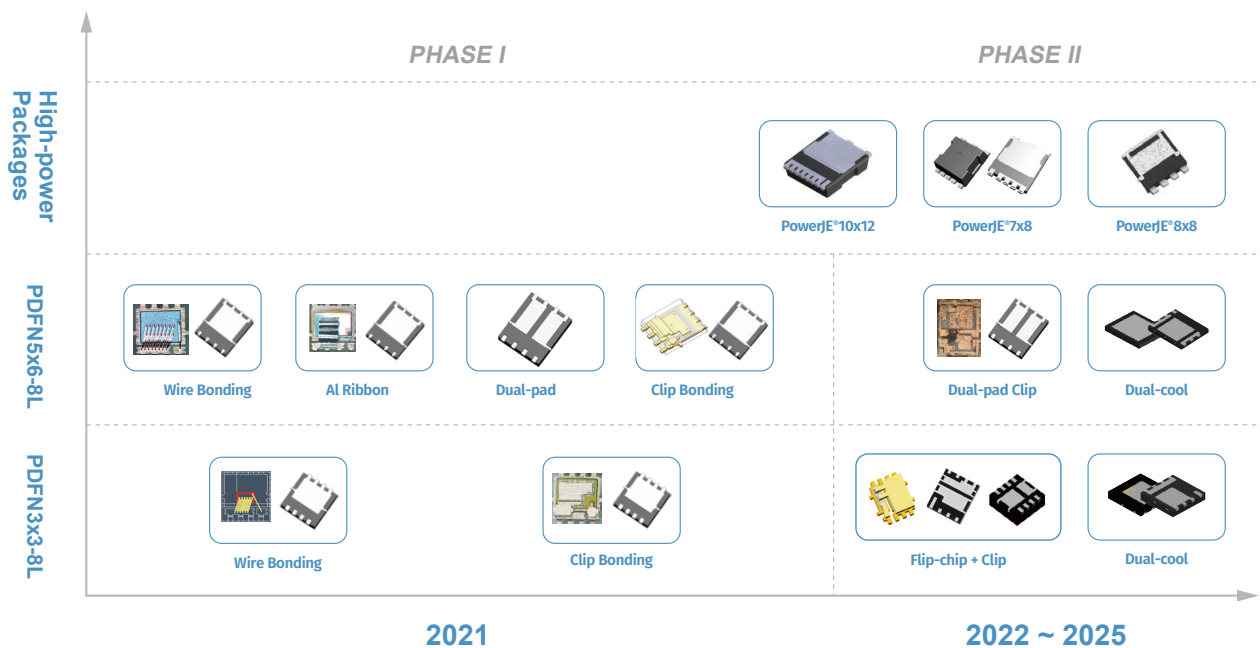
TSSOP-8

# 封装优势 PACKAGING ADVANTAGES

## Advanced Packaging

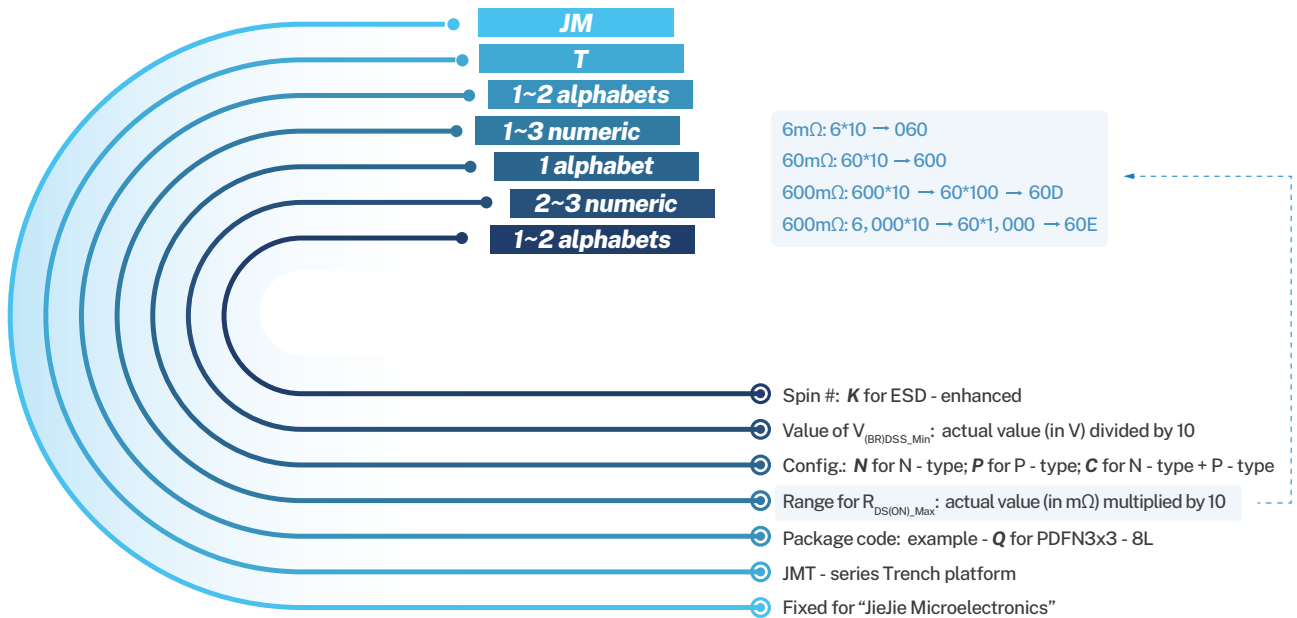


## Roadmap for Power & Auto Packages



# 产品命名规则

## Nomenclature of JMT-series N-ch and P-ch Trench LV/MV MOSFETs



Technology: Trench ( $V_{DS\_Max} \leq -40 \sim 100V$ ); JMT Series

### -40 ~ 100V

对于消费类电子产品、便携式和3C应用、电子烟、电动工具、台式及笔记本主板、负载开关、PD、无线充、直流无线电机、负载开关、锂电保护、同步整流、直流转直流、LED背光、PoE电源等应用，捷捷微电提供下面列表里的 -40 ~ 100V<sub>DS\_Max</sub> Trench MOSFETs 予电路设计工程师选用。

Product Name	JJM Package	Compatible Industry-common Package	Configuration	$V_{DS\_Max}$ (V)	$I_{D\_Max}$ (A)	$V_{GS(th)\_Typ}$ (V)	$R_{DS(ON)\_Typ}$ @ $V_{GS}=10V$ (mΩ)	$R_{DS(ON)\_Max}$ @ $V_{GS}=10V$ (mΩ)	$R_{DS(ON)\_Typ}$ @ $V_{GS}=4.5V$ (mΩ)	$R_{DS(ON)\_MAX}$ @ $V_{GS}=4.5V$ (mΩ)	$R_{DS(ON)\_Typ}$ @ $V_{GS}=2.5V$ (mΩ)	$R_{DS(ON)\_MAX}$ @ $V_{GS}=2.5V$ (mΩ)	$V_{GS\_Max}$ (V)	$E_{AS\_Max}$ (mJ)	$C_{iss\_Typ}$ (pF)	$C_{oss\_Typ}$ (pF)	$C_{rfs\_Typ}$ (pF)	$Q_g\_Typ$ (nC)	FOM
JMTC085P04A	TO-220C-3L	TO-220	P	-40	-70.0	-1.5	8.0	10.0	11.0	15.0	-	-	±20	324.0	7,200	625.0	437.0	-	-
JMTK085P04A	TO-252-3L	DPAK	P	-40	-70.0	-1.5	7.1	9.2	9.3	13.0	-	-	±20	182.0	7,200	625.0	437.0	-	-
JMTK130P04A	TO-252-3L	DPAK	P	-40	-40.0	-1.7	10.0	13.0	15.0	22.0	-	-	±20	144.0	3,800	329.0	289.0	-	-
JMTG130P04A	PDFN5x6-8L	SuperSO8	P	-40	-35.0	-1.7	9.4	12.5	13.4	18.5	-	-	±20	132.0	3,800	329.0	289.0	-	-
JMTP130P04A	SOP-8L	SO-8	P	-40	-12.0	-1.7	11.0	14.3	15.5	22.0	-	-	±20	-	3,800	329.0	289.0	-	-
JMTQ130P04A	PDFN3x3-8L	PQFN 3x3	P	-40	-30.0	-1.5	10.3	13.0	13.6	19.0	-	-	±20	96.0	3,700	340.0	290.0	-	-
JMTP520P04A	SOP-8L	SO-8	P	-40	-5.5	-1.6	39.0	51.0	56.0	78.0	-	-	±20	-	869	94.0	69.0	-	-
JMTK440P04A	TO-252-3L	DPAK	P	-40	-10.0	-1.6	34.0	44.0	44.0	60.0	-	-	±20	-	1,034	107.0	79.5	-	-
JMTQ440P04A	PDFN3x3-8L	PQFN 3x3	P	-40	-8.0	-1.6	33.0	43.0	44.0	60.0	-	-	±20	25.0	1,034	107.0	79.5	-	-
JMTP440P04A	SOP-8L	SO-8	P	-40	-6.0	-1.5	36.0	47.0	47.0	66.0	-	-	±20	27.6	1,034	107.0	79.5	-	-
JMTP850P04A	SOP-8L	SO-8	P	-40	-5.0	-1.6	65.0	85.0	80.0	112.0	-	-	±20	-	573	53.0	42.0	-	-
JMTL850P04A	SOT-23	SOT-23	P	-40	-5.0	-1.6	70.0	90.0	90.0	125.0	-	-	±20	-	573	53.0	42.0	-	-
JMTM850P04A	SOT-23-6L	-	P	-40	-5.0	-1.6	66.0	85.0	82.0	115.0	-	-	±20	-	573	53.0	42.0	-	-
JMTG050P03A	PDFN5x6-8L	SuperSO8	P	-30	-80.0	-1.5	3.3	4.3	5.1	7.2	-	-	±20	225.0	9,400	1,000.0	767.0	-	-
JMTK050P03A	TO-252-3L	DPAK	P	-30	-100.0	-1.5	4.0	5.3	5.8	8.2	-	-	±20	225.0	9,400	1,000.0	767.0	-	-
JMTK060P03A	TO-252-3L	DPAK	P	-30	-90.0	-1.6	4.9	6.4	7.5	10.5	-	-	±20	210.0	6,800	769.0	726.0	-	-
JMTG060P03A	PDFN5x6-8L	SuperSO8	P	-30	-75.0	-1.6	4.3	5.6	7.0	9.8	-	-	±20	210.0	6,800	769.0	726.0	-	-
JMTQ080P03A	PDFN3x3-8L	PQFN 3x3	P	-30	-45.0	-1.5	5.8	7.5	9.0	12.6	-	-	±20	144.0	4,650	550.0	486.0	-	-
JMTK080P03A	TO-252-3L	DPAK	P	-30	-60.0	-1.5	5.8	7.5	9.0	12.6	-	-	±20	144.0	4,650	550.0	486.0	-	-
JMTI080P03A	TO-251-3L	DPAK3	P	-30	-60.0	-1.5	5.8	7.5	9.0	12.6	-	-	±20	144.0	4,650	550.0	486.0	-	-
JMTG080P03A	PDFN5x6-8L	SuperSO8	P	-30	-50.0	-1.5	6.0	7.8	9.0	12.6	-	-	±20	144.0	4,650	550.0	486.0	-	-
JMTP080P03A	SOP-8L	SO-8	P	-30	-15.0	-1.5	7.0	9.0	10.0	14.0	-	-	±20	144.0	4,650	550.0	486.0	-	-
JMTQ100P03A	PDFN3x3-8L	PQFN 3x3	P	-30	-40.0	-1.6	7.5	10.0	11.6	16.0	-	-	±20	121.0	3,564	416.0	373.0	-	-
JMTK100P03A	TO-252-3L	DPAK	P	-30	-55.0	-1.6	7.5	10.0	11.6	16.0	-	-	±20	121.0	3,564	416.0	373.0	-	-
JMTG100P03A	PDFN5x6-8L	SuperSO8	P	-30	-45.0	-1.6	7.6	10.0	12.0	16.8	-	-	±20	113.0	3,564	416.0	373.0	-	-
JMTK50P03A	TO-252-3L	DPAK	P	-30	-50.0	-1.5	8.6	11.0	13.0	18.0	-	-	±20	78.8	2,800	346.0	319.0	-	-
JMTQ4407A	PDFN3x3-8L	PQFN 3x3	P	-30	-35.0	-1.5	8.6	11.0	13.0	18.0	-	-	±20	78.8	2,800	346.0	319.0	-	-
JMTP4407A	SOP-8L	SO-8	P	-30	-12.0	-1.5	9.3	14.0	14.0	20.0	-	-	±20	64.0	2,800	346.0	319.0	-	-
JMTK160P03A	TO-252-3L	DPAK	P	-30	-45.0	-1.6	10.0	14.0	16.0	22.5	-	-	±20	64.0	2,130	280.0	252.0	-	-
JMTP160P03D	SOP-8L	SO-8	P+P	-30	-11.0	-1.6	12.7	17.0	19.0	27.0	-	-	±20	68.0	2,130	280.0	252.0	-	-
JMTQ160P03A	PDFN3x3-8L	PQFN 3x3	P	-30	-15.0	-1.6	11.0	14.0	17.0	24.0	-	-	±20	40.0	2,070	273.0	246.0	-	-



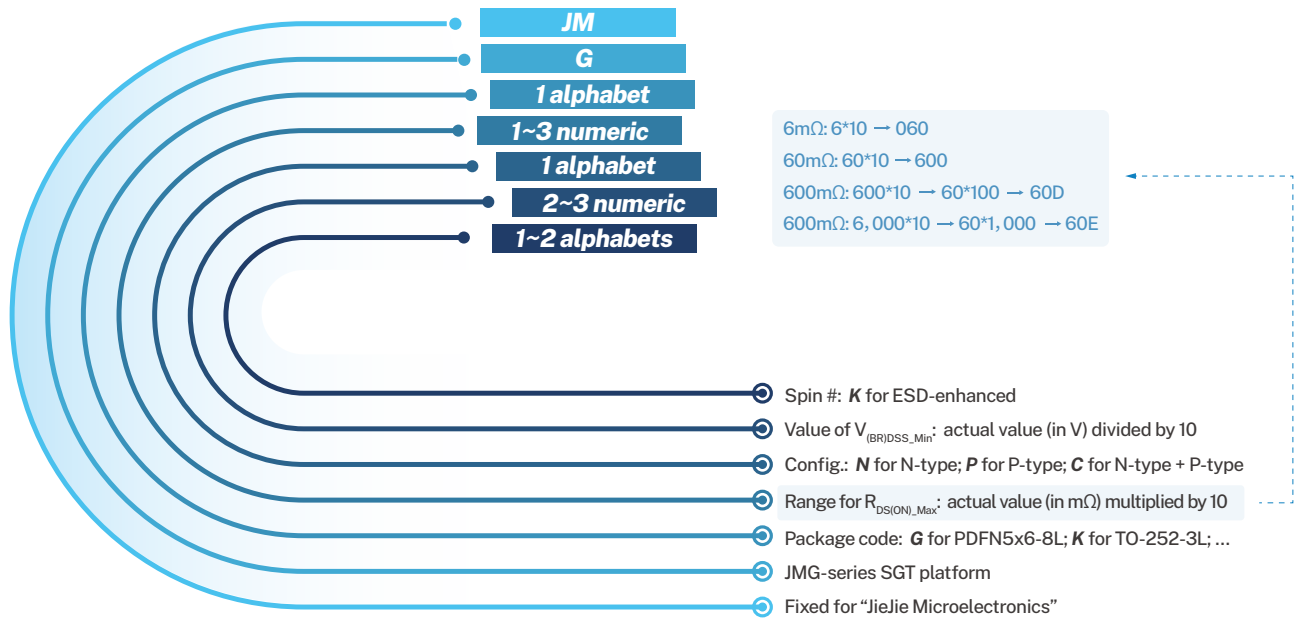




Table with columns: Product Name, JJC Package, Compatible Industry-common Package, Configuration, VGS-Max (V), Id, Max (A), VGSBI Typ (V), RDSION Typ @ VGS=10V (mΩ), RDSION Max @ VGS=10V (mΩ), RDSION Typ @ VGS=4.5V (mΩ), RDSION Max @ VGS=4.5V (mΩ), RDSION Typ @ VGS=2.5V (mΩ), RDSION Max @ VGS=2.5V (mΩ), VGS Max (V), EAS Max (mJ), Ciss Typ (pF), Coss Typ (pF), Qg Typ (nC), FOM.

# 产品命名规则

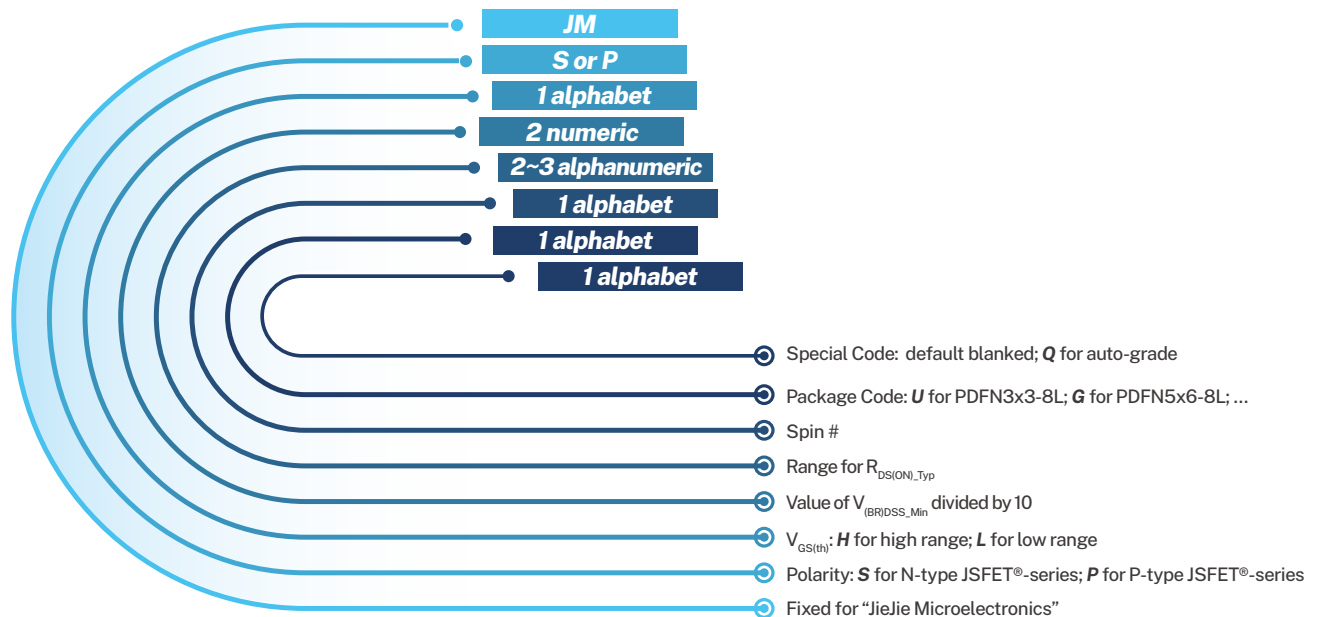
## Nomenclature of JMG-series N-ch and P-ch SGT LV/MV MOSFETs



Technology: Shielded Gate ( $V_{DS\_Max} = -100 \sim 120V$ ); JMG Series

# 产品命名规则

## Nomenclature of JSFET<sup>®</sup> N-ch & JPFET<sup>®</sup> P-ch SGT LV/MV MOSFETs



Technology: Shielded Gate ( $V_{DS\_Max} = -100 \sim 150V$ ); JPFET<sup>®</sup> / JSFET<sup>®</sup> Series

# 40 ~ 150V

对于车载前装及后装等各类中低压应用如辅助驾驶 (ADAS)、车载信息娱乐系统、逆变器非高压部份里的 DC-DC 同步整流、车身控制模块里 [电机驱动、继电器、负载开关] 等功能, 捷捷微电提供以下列表里的 40 ~ 150V<sub>DS\_Max</sub> 车规级 SGT MOSFETs 予电路设计工程师选用。

Product Name	JJM Package	Compatible Industry-common Package	Configuration	V <sub>DS_Max</sub> (V)	I <sub>D_Max</sub> (A)	V <sub>GS(TH)_Typ</sub> (V)	R <sub>DS(on)_Typ</sub> @V <sub>GS=10V</sub> (mΩ)	R <sub>DS(on)_Max</sub> @V <sub>GS=10V</sub> (mΩ)	R <sub>DS(on)_Typ</sub> @V <sub>GS=4.5V</sub> (mΩ)	R <sub>DS(on)_Max</sub> @V <sub>GS=4.5V</sub> (mΩ)	R <sub>DS(on)_Typ</sub> @V <sub>GS=2.5V</sub> (mΩ)	R <sub>DS(on)_Max</sub> @V <sub>GS=2.5V</sub> (mΩ)	V <sub>GS_Max</sub> (V)	E <sub>AS_Max</sub> (mJ)	C <sub>FEF_Typ</sub> (pF)	C <sub>oss_Typ</sub> (pF)	C <sub>FEF_Typ</sub> (pF)	Q <sub>g_Typ</sub> (nC)	FOM
JMSL0405AGQ	PDFN5x6-8L	SuperSO8	N	40	387.0	1.5	0.58	0.75	0.80	0.99	-	-	±20	506.0	7,654	3738.0	44.0	114.0	66
JMSL0401BGQ	PDFN5x6-8L	SuperSO8	N	40	299.0	1.5	0.83	0.98	1.20	1.60	-	-	±20	726.0	5,495	3347.0	44.0	80.0	66
JMSH0401BGQ	PDFN5x6-8L	SuperSO8	N	40	276.0	2.8	0.90	1.10	-	-	-	-	±20	441.0	5,280	3405.0	71.0	68.0	61
JMSL0401AGQ	PDFN5x6-8L	SuperSO8	N	40	198.0	1.6	1.3	1.7	1.7	2.3	-	-	±20	194.0	3,125	1607.0	18.0	47.0	61
JMSH0401AGQ	PDFN5x6-8L	SuperSO8	N	40	197.0	2.8	1.3	1.7	-	-	-	-	±20	194.0	3,015	2000.0	18.0	42.0	55
JMSL0402AGQ	PDFN5x6-8L	SuperSO8	N	40	183.0	1.6	1.6	2.0	2.2	3.0	-	-	±20	163.0	3,133	1993.0	75.0	46.0	74
JMSL0406AGQ	PDFN5x6-8L	SuperSO8	N	40	90.0	1.6	4.2	5.2	5.8	7.6	-	-	±20	36.0	1,204	536.0	51.0	17.9	75
JMSL0406AKQ	TO-252-3L	DPAK	N	40	78.0	1.6	4.7	5.6	6.0	7.8	-	-	±20	36.0	1,204	536.0	51.0	17.9	84
JMSL0406AGDQ	PDFN5x6-8L-D	-	N+N	40	49.0	1.6	5.5	6.9	7.0	9.5	-	-	±20	36.0	1,227	526.0	55.0	17.9	98
JMSL0406AUQ	PDFN3x3-8L	PQFN 3x3	N	40	57.0	1.6	4.5	5.6	5.9	7.8	-	-	±20	36.0	1,204	536.0	51.0	17.9	81
JMSH0601ATLQ	PowerJE®10x12	TOLL	N	60	348.0	2.8	1.2	1.6	-	-	-	-	±20	480.0	7,312	2239.0	53.0	102.0	122
JMSL0601BGQ	PDFN5x6-8L	SuperSO8	N	60	252.0	1.6	1.3	1.6	1.8	2.5	-	-	±20	1,634.0	4,685	1429.0	40.0	75.0	94
JMSH0601AGQ	PDFN5x6-8L	SuperSO8	N	60	225.0	2.8	1.3	1.7	-	-	-	-	±20	375.0	5,874	1375.0	45.0	81.0	105
JMSL0602AGQ	PDFN5x6-8L	SuperSO8	N	60	172.0	1.7	1.8	2.3	2.4	3.2	-	-	±20	240.0	2,880	958.0	44.0	48.0	86
JMSH0602AGQ	PDFN5x6-8L	SuperSO8	N	60	168.0	2.8	1.9	2.4	-	-	-	-	±20	240.0	3,562	896.0	43.0	50.0	95
JMSL0603BGQ	PDFN5x6-8L	SuperSO8	N	60	147.0	1.6	2.4	3.0	3.4	4.4	-	-	±20	338.0	3,174	872.0	39.0	51.0	122
JMSL0604AGQ	PDFN5x6-8L	SuperSO8	N	60	112.0	1.6	3.6	4.5	4.7	5.9	-	-	±20	94.0	2,030	445.0	4.4	32.0	115
JMSL0606AGQ	PDFN5x6-8L	SuperSO8	N	60	103.0	1.6	4.0	5.0	5.2	6.5	-	-	±20	94.0	2,030	445.0	4.4	32.0	128
JMSL0606AKQ	TO-252-3L	DPAK	N	60	93.0	1.6	4.6	5.8	6.0	7.5	-	-	±20	94.0	2,122	440.0	4.4	32.0	147
JMSL0606AUQ	PDFN3x3-8L	PQFN 3x3	N	60	59.0	1.6	5.0	6.2	6.0	7.8	-	-	±20	94.0	2,122	440.0	4.8	32.0	160
JMSL0609AGQ	PDFN5x6-8L	SuperSO8	N	60	67.0	1.6	7.2	9.4	9.0	12.0	-	-	±20	34.0	1,087	309.0	8.5	16.6	120
JMSL0609AUQ	PDFN3x3-8L	PQFN 3x3	N	60	44.0	1.6	7.5	9.4	9.4	12.2	-	-	±20	34.0	1,087	309.0	8.5	16.6	125
JMSL0610AGDQ	PDFN5x6-8L-D	-	N+N	60	38.0	1.6	8.5	10.6	10.2	13.0	-	-	±20	34.0	1,087	309.0	8.5	16.6	141
JMSL0612AGQ	PDFN5x6-8L	SuperSO8	N	60	52.0	1.6	9.5	12.0	12.0	16.0	-	-	±20	20.0	731	224.0	7.4	13.9	132
JMSL0612AUQ	PDFN3x3-8L	PQFN 3x3	N	60	36.0	1.6	10.0	12.5	12.3	16.0	-	-	±20	20.0	731	224.0	7.4	13.9	139
JMSL0615AGDQ	PDFN5x6-8L-D	-	N+N	60	33.0	1.6	10.5	13.5	13.5	17.5	-	-	±20	20.0	731	224.0	7.4	13.9	146
JMSH1001ATLQ	PowerJE®10x12	TOLL	N	100	348.0	2.8	1.3	1.6	-	-	-	-	±20	512.0	9,623	2091.0	1.2	155.0	202
JMSH1003AGQ	PDFN5x6-8L	SuperSO8	N	100	170.0	2.7	2.8	3.5	-	-	-	-	±20	346.0	4,374	1140.0	4.7	70.0	196
JMSH1003AE7Q	TO-263-7L	D <sup>2</sup> PAK7	N	100	196.0	2.7	2.8	3.5	-	-	-	-	±20	406.0	4,398	1361.0	8.5	66.0	185
JMSH1004BGQ	PDFN5x6-8L	SuperSO8	N	100	138.0	2.7	3.3	4.3	-	-	-	-	±20	231.0	3,434	906.0	14.0	57.0	188
JMSH1004BEQ	TO-263-7L	D <sup>2</sup> PAK7	N	100	160.0	2.7	3.5	4.2	-	-	-	-	±20	304.0	3,433	905.0	13.0	57.0	200
JMSL1006AGQ	PDFN5x6-8L	SuperSO8	N	100	110.0	1.8	4.7	5.9	5.9	7.7	-	-	±20	110.0	2,604	567.0	9.6	42.0	197
JMSL1008AGQ	PDFN5x6-8L	SuperSO8	N	100	88.0	1.8	6.0	7.6	8.0	10.0	-	-	±20	102.0	2,200	445.0	8.0	34.0	204
JMSH1008AGQ	PDFN5x6-8L	SuperSO8	N	100	87.0	2.7	6.2	7.8	-	-	-	-	±20	144.0	1,920	445.0	7.0	30.0	186
JMSH1018AGQ	PDFN5x6-8L	SuperSO8	N	100	45.0	2.7	15.8	19.8	-	-	-	-	±20	39.0	769	171.0	5.1	12.7	201
JMSL1010AGQ	PDFN5x6-8L	SuperSO8	N	100	68.0	1.9	8.0	10.0	10.5	13.7	-	-	±20	94.0	1,535	335.0	8.2	26.0	208
JMSH1010AGQ	PDFN5x6-8L	SuperSO8	N	100	64.0	2.7	8.8	11.0	-	-	-	-	±20	94.0	1,372	291.0	6.2	21.0	185
JMSL1018AGQ	PDFN5x6-8L	SuperSO8	N	100	47.0	1.8	15.0	18.7	18.7	24.4	-	-	±20	29.0	769	171.0	5.1	12.7	191
JMSL1018AUQ	PDFN3x3-8L	PQFN 3x3	N	100	29.0	1.8	16.2	20.0	20.8	27.0	-	-	±20	29.0	769	171.0	5.1	12.7	206
JMSL1020AGDQ	PDFN5x6-8L-D	-	N+N	100	27.0	1.8	16.5	20.0	21.0	27.0	-	-	±20	29.0	769	171.0	5.1	12.7	210
JMSL1040AGQ	PDFN5x6-8L	SuperSO8	N	100	27.0	1.8	29.0	36.0	39.0	50.0	-	-	±20	14.0	363	85.0	3.0	6.8	197
JMSL1040AUQ	PDFN3x3-8L	PQFN 3x3	N	100	20.0	1.8	29.0	39.0	39.0	50.0	-	-	±20	14.0	363	85.0	3.0	6.8	197
JMSH1504AEQ	TO-263-3L	D <sup>2</sup> PAK	N	150	210.0	3.2	3.9	4.9	-	-	-	-	±20	889.0	6,540	772.0	6.7	88.0	343
JMSH1507AEQ	TO-263-3L	D <sup>2</sup> PAK	N	150	161.0	3.2	5.2	6.5	-	-	-	-	±20	540.0	4,320	535.0	7.2	68.0	354
JMSH1508AEQ	TO-263-3L	D <sup>2</sup> PAK	N	150	117.0	3.2	6.7	8.4	-	-	-	-	±20	265.0	3,395	457.0	17.0	47.0	315
JMSH1509AGQ	PDFN5x6-8L	SuperSO8	N	150	87.0	3.2	8.5	9.9	-	-	-	-	±20	331.0	2,181	363.0	7.9	30.0	255
JMSH1535AGQ	PDFN5x6-8L	SuperSO8	N	150	29.0	3.3	27.0	35.0	-	-	-	-	±20	48.0	760	113.0	23.0	12.3	332

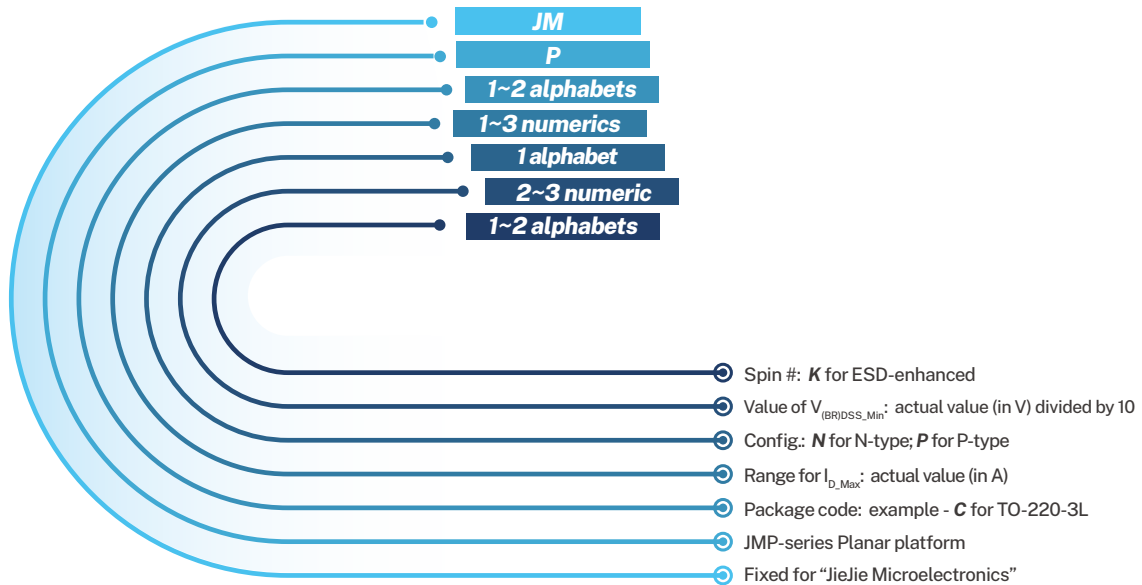








# ▶ 产品命名规则 Nomenclature of JMP-series N-ch Planar HV MOSFET

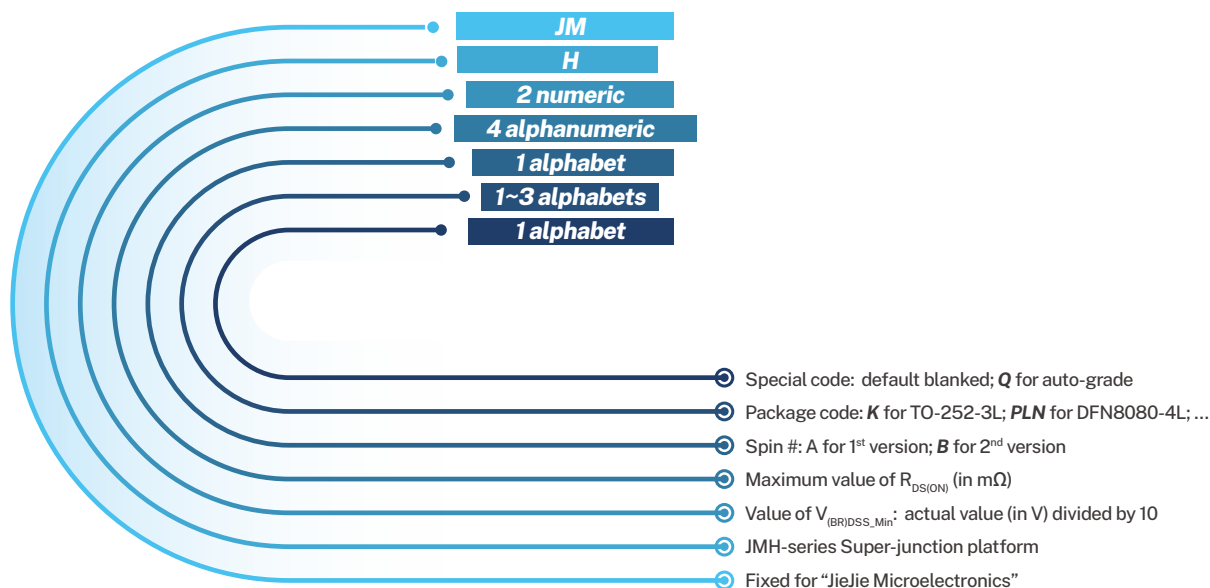


Technology: Planar ( $V_{DS\_Max} \geq 500V$ ); JMP Series

**500 ~ 1000V** 对于整流器、PC电源、LED电源、LCD电源、开关电源、适配器、充电器等应用，捷捷微电提供下面列表里的 500 ~ 1000V<sub>DS\_Max</sub> Planar MOSFETs 予电路设计工程师选用。

Product Name	JJM Package	Compatible Industry-common Package	Configuration	$V_{DS\_Max}$ (V)	$I_{D\_Max}$ (A)	$V_{GS(th)\_Typ}$ (V)	$R_{DS(on)\_Typ}$ @ $V_{GS}=10V$ (m $\Omega$ )	$R_{DS(on)\_Max}$ @ $V_{GS}=10V$ (m $\Omega$ )	$R_{DS(on)\_Typ}$ @ $V_{GS}=4.5V$ (m $\Omega$ )	$R_{DS(on)\_Max}$ @ $V_{GS}=4.5V$ (m $\Omega$ )	$R_{DS(on)\_Typ}$ @ $V_{GS}=2.5V$ (m $\Omega$ )	$R_{DS(on)\_Max}$ @ $V_{GS}=2.5V$ (m $\Omega$ )	$V_{GS\_Max}$ (V)	$E_{AS\_Max}$ (mJ)	$C_{iss\_Typ}$ (pF)	$C_{iss\_Typ}$ (pF)	$C_{iss\_Typ}$ (pF)	$Q_{g-3.3V}$ (nC)	FOM
JMPK840G1	TO-252-3L	DPAK	N	500	9.0	3.0	680.0	800.0	-	-	-	-	±30	180.0	1,100	106.0	32.0	-	-
JMPF20N60G1	TO-220FP-3L	-	N	600	20.0	3.0	310.0	380.0	-	-	-	-	±30	605.0	3,229	271.0	17.0	-	-
JMPF13N60G1	TO-220FP-3L	-	N	600	13.0	3.0	500.0	650.0	-	-	-	-	±30	304.0	2,125	181.0	15.0	-	-
JMPF8N60G1	TO-252-3L	DPAK	N	600	8.0	3.0	1,000.0	1,180.0	-	-	-	-	±30	145.8	1,160	109.0	12.0	-	-
JMPK2N60G1	TO-252-3L	DPAK	N	600	2.0	3.0	3,900.0	4,700.0	-	-	-	-	±30	54.0	293	35.0	7.0	-	-
JMPK1N60G1	TO-252-3L	DPAK	N	600	1.0	3.0	8,800.0	11,000.0	-	-	-	-	±30	-	137	17.0	3.0	-	-
JMPF20N65G1	TO-220FP-3L	-	N	650	20.0	3.0	350.0	440.0	-	-	-	-	±30	661.0	3,300	255.0	13.0	-	-
JMPF16N65G1	TO-220FP-3L	-	N	650	16.0	3.0	480.0	580.0	-	-	-	-	±30	461.0	2,740	214.0	15.0	-	-
JMPF10N65G1	TO-220FP-3L	-	N	650	10.0	3.0	750.0	950.0	-	-	-	-	±30	245.0	1,720	140.0	11.0	-	-
JMPF9N65G1	TO-220FP-3L	-	N	650	9.0	3.0	900.0	1,080.0	-	-	-	-	±30	218.0	1,446	128.0	13.0	-	-
JMPK9N65G1	TO-252-3L	DPAK	N	650	9.0	3.0	900.0	1,080.0	-	-	-	-	±30	211.0	1,400	114.0	26.0	-	-
JMPK7N65G1	TO-252-3L	DPAK	N	650	7.0	3.0	1,150.0	1,350.0	-	-	-	-	±30	198.0	1,148	106.0	12.0	-	-
JMPF7N65G1	TO-220FA-3L	-	N	650	7.0	3.0	1,100.0	1,350.0	-	-	-	-	±30	198.0	1,148	106.0	12.0	-	-
JMPK2N65G1	TO-252-3L	DPAK	N	650	2.0	3.0	4,500.0	5,500.0	-	-	-	-	±30	31.0	296	34.0	7.0	-	-
JMPF10N80G1	TO-220FP-3L	-	N	800	10.0	3.5	740.0	900.0	-	-	-	-	±30	605.0	2,578	217.0	26.0	-	-
JMPF9N90G1	TO-220FP-3L	-	N	900	9.0	3.5	960.0	1,100.0	-	-	-	-	±30	605.0	2,500	186.0	23.0	-	-
JMPF6N100G1	TO-220FP-3L	-	N	1000	6.0	3.5	12,000.0	14,000.0	-	-	-	-	±30	461.0	2,495	173.0	22.0	-	-

# 产品命名规则 Nomenclature of JHFET® Super-junction HV MOSFETs



Technology: Super-junction ( $V_{DS\_Max} = 650V$ ); JHFET® Series

**650V** 对于快充、AC / DC 电源、逆变器等应用，捷捷微电提供下面列表里的 650V<sub>DS\_Max</sub> SJ MOSFET 予电路工程师选用。

Product Name	JJM Package	Compatible Industry-common Package	Configuration	$V_{DS\_Max}$ (V)	$I_{D\_Max}$ (A)	$V_{GS(ON)\_TYP}$ (V)	$R_{DS(ON)\_TYP}$ @ $V_{GS}=10V$ (mΩ)	$R_{DS(ON)\_TYP}$ @ $V_{GS}=10V$ (mΩ)	$R_{DS(ON)\_TYP}$ @ $V_{GS}=4.5V$ (mΩ)	$R_{DS(ON)\_MAX}$ @ $V_{GS}=4.5V$ (mΩ)	$R_{DS(ON)\_TYP}$ @ $V_{GS}=2.5V$ (mΩ)	$R_{DS(ON)\_MAX}$ @ $V_{GS}=2.5V$ (mΩ)	$V_{GS\_Max}$ (V)	$E_{AS\_Max}$ (mJ)	$C_{FIS\_TYP}$ (pF)	$C_{OSS\_TYP}$ (pF)	$C_{FIS\_TYP}$ (pF)	$Q_{S\_TYP}$ (nC)	FOM
JMH65R190AC	TO-220-3L	-	N	650	20.0	3.5	170.0	190.0	-	-	-	-	±20	405.0	1,560	61.0	11.7	38.0	6,460
JMH65R190AE	TO-263-3L	D <sup>2</sup> PAK	N	650	20.0	3.5	170.0	190.0	-	-	-	-	±20	405.0	1,560	61.0	11.7	38.0	6,460
JMH65R190APLN	DFN8080-4L	-	N	650	17.4	3.5	169.0	190.0	-	-	-	-	±20	405.0	1,560	61.0	11.7	38.0	6,422
JMH65R190AS	TO-247-3L	TO-247	N	650	20.0	3.5	168.0	190.0	-	-	-	-	±20	405.0	1,560	61.0	11.7	38.0	6,384
JMH65R190AW	TO-263-2L	-	N	650	20.0	3.5	170.0	190.0	-	-	-	-	±20	405.0	1,560	61.0	11.7	38.0	6,460
JMH65R190AF	TO-220FP-3L	-	N	650	20.0	3.5	170.0	190.0	-	-	-	-	±20	405.0	1,560	61.0	11.7	38.0	6,460
JMH65R190AFFD	TO-220FP-3L	-	N	650	20.0	3.5	170.0	190.0	-	-	-	-	±20	405.0	1,560	61.0	11.7	38.0	6,460
JMH65R290APLN	DFN8080-4L	-	N	650	10.0	3.5	262.0	290.0	-	-	-	-	±20	281.0	1,056	31.0	10.0	22.0	5,764
JMH65R290ACFP	TO-220FP-NL	-	N	650	12.0	3.5	260.0	290.0	-	-	-	-	±20	281.0	1,056	31.0	10.0	22.0	5,720
JMH65R430APLN	DFN8080-4L	-	N	650	10.4	3.5	370.0	430.0	-	-	-	-	±20	180.0	703	25.0	2.1	18.4	6,808
JMH65R430AE	TO-263-3L	D <sup>2</sup> PAK	N	650	11.2	3.5	364.0	430.0	-	-	-	-	±20	180.0	703	25.0	2.1	18.4	6,698
JMH65R430AF	TO-220FP-3L	-	N	650	11.2	3.5	364.0	430.0	-	-	-	-	±20	180.0	703	25.0	2.1	18.4	6,698
JMH65R430ACFP	TO-220FP-NL	-	N	650	11.2	3.5	364.0	430.0	-	-	-	-	±20	180.0	703	25.0	2.1	18.4	6,698
JMH65R430AK	TO-252-3L	DPAK	N	650	11.2	3.5	370.0	430.0	-	-	-	-	±20	180.0	703	25.0	2.1	18.4	6,808
JMH65R490AFFD	TO-220FP-3L	-	N	650	5.4	3.5	430.0	490.0	-	-	-	-	±20	180.0	677	26.0	6.8	20.0	8,600
JMH65R980AFFD	TO-220FP-3L	-	N	650	4.0	3.5	895.0	980.0	-	-	-	-	±20	72.0	343	20.0	3.5	10.1	9,040
JMH65R980AK	TO-252-3L	DPAK	N	650	4.0	3.5	900.0	980.0	-	-	-	-	±20	80.0	333	20.0	2.5	9.7	8,730

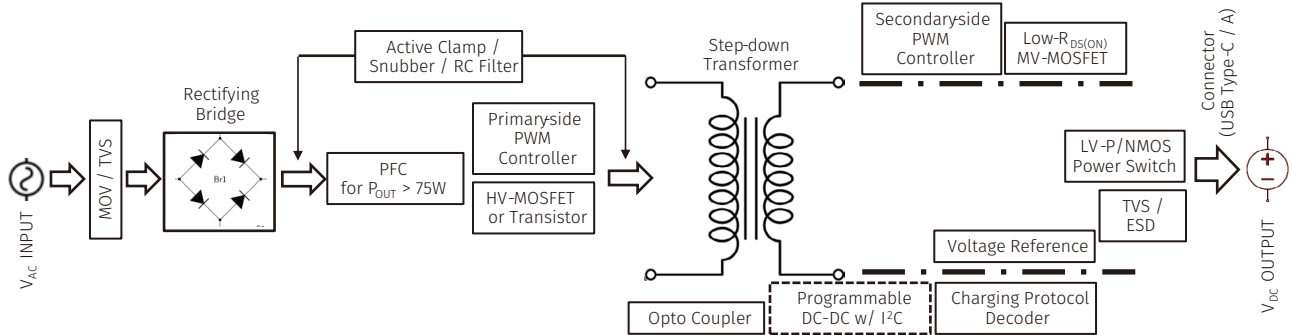


# 快充充电器 FAST CHARGER

(兼容标准和私有协议)

输出功率从 18W 到 100W (甚至 120W 或更大), 支持快充协议 (USB PD3.0/3.1, USB BC1.2, QCx, PE+, S/FCP, SCP, AFC, ...), 配置一个或多个 USB Type-A/C 输出接口的快充充电器日益普遍。因为它们可以一物多用, 能为智能手机、平板及笔记本电脑等万物互联数字化终端里面的锂电池快速充电。采用第三代半导体功率器件如氮化镓 HEMT 的设计, 由于体积小巧及使用较低的温升, 有望成为未来的市场主流。近来多家世界排名前列的智能手机 OEM 开始不把充电器跟新手机标配, 快充充电器的市场将会出现曲棍球棒效应。

市场上的快充充电器, 常用的交直流电源转换拓扑是 Flyback 和 LLC。Flyback 拓扑常见于功率比较小的设计, LLC 拓扑常见于功率较大及对交直流电源转换效率要求较高的设计; 因为 BOM 相对 LLC 拓扑比较简单, ACF 拓扑也会见于功率不小的设计, 特别是初级使用高压氮化镓 HEMT 的设计。无论是哪种拓扑, 快充充电器的内部结构示意图大概如下:



因应快充充电器, 捷捷微电大都能提供完整分立器件解决方案。比如, AC 输入端防浪涌的 MOV、钳制变压器漏感而对初级的高压 MOSFET  $V_{DS\_Max}$  产生过压的快恢复整流管、原边 PFC (75W 以上的设计) 和 PWM 的高压 MOSFETs、次级同步整流及 USB Type-A/C 端口输出开关的中/低压 MOSFETs、USB Type-A/C 端口的 ESD 保护等。

## 快恢复整流管

Product Name	Charger's O/P (W)	$I_{F(AV)\_Max}$ (A)	$V_{RRM\_Max}$ (V)	$I_{FSM\_Max}$ (A)	$V_{F\_Max}$ (V) @ $I_F$ (A)	$I_{R\_Max}$ ( $\mu$ A)	$C_{T\_Max}$ (pF)	$t_{tr\_Max}$ (ns)	Package
RS1010FL	20 ~ 65	1.0	1000	25	1.3 / 1	5.0	7.0	500	SOD-123FL
RS1MAF	20 ~ 65	1.0	1000	30	1.3 / 1	5.0	7.0	500	SMAF
RS3MB	90 ~ 120	3.0	1000	100	1.3 / 3	5.0	30.0	500	SMB
US5M	90 ~ 120	5.0	1000	125	1.7 / 5	5.0	35.0	75	SMC

## USB Type-A 及 Type-C 端口 ESD 保护

Product Name	Pin(s) Protected	Direction	$V_{RRM\_Max}$ (V)	$V_{BR\_Min}$ (V)	$V_{C\_Max}$ (V)	@ $I_{pp}$ (A)	$I_{R\_Max}$ ( $\mu$ A)	$P_{PP\_Max}$ (W)	$V_{ESD\_Air}^{*1}$ (kV)	$V_{ESD\_Contact}^{*1}$ (kV)	$C_{L\_Typ}$ (pF)	Package
JEU24P3	$V_{BUS}$	Uni-dir	24.0	26.0	35.0	200	0.50	5,100	$\pm$ 30	$\pm$ 30	750	DFN2020-3L
JEU12N3		Uni-dir	12.0	13.0	32.0	180	1.00	4,500	$\pm$ 30	$\pm$ 30	950	
JEU12T2BL	CC0 / CC1	Uni-dir	12.0	13.0	26.0	20	0.15	500	$\pm$ 30	$\pm$ 30	90	SOT-23
JEU05T2B		Uni-dir	5.0	6.0	16.7	18	1.00	350	$\pm$ 15	$\pm$ 8	150	
JEB12C	D+ / D-	Bi-dir	12.0	13.3	30.0	12	1.00	350	$\pm$ 30	$\pm$ 30	1.0	SOD-323
JEB03CX		Bi-dir	3.3	3.6	17.5	20	0.10	350	$\pm$ 30	$\pm$ 30	1.0	

不论在初级使用的是传统的超结高压 MOSFETs (请参考第 15 页产品列表)、或是日益受电路设计工程师及消费者追捧的氮化镓 HEMT, 在拓扑的次级, 捷捷微电先进自有 JSFET<sup>®</sup> 技术平台的 SGT MOSFETs 在同步整流和在 USB-C<sup>®</sup> 端口电流输出开关等位置, 都不可或缺。

建立在 JSFET 技术平台的 30 ~ 150V<sub>DS\_Max</sub> SGT N-MOSFETs, 导通阻抗  $R_{DS(ON)}$  低至 0.55 m $\Omega$ 、FOM 低至 47, 所有产品均百分百通过 UIS 测试。凭借低  $C_{iss}$  (96 pF)、 $C_{oss}$  (32 pF)、 $C_{riss}$  (1.2 pF)、 $Q_g$  (2.5 nC)、卓越的安全操作区域 (SOA), 这些功率器件能更有效地解决在终端应用中存在的软/硬开关、电感负载、EMI 等难题。能够有如此突出的静态和动态电气特性, 是因为捷捷微电的自有 JSFET 平台, 各项工艺参数早已跻身国际一流水平。比如, 已量产多时的 30V SGT MOSFETs, 它的  $R_{ON,sp}$  与欧美一线功率器件 IDM 英飞凌的新一代同类产品不遑多让。80V SGT MOSFETs 在使用捷捷微电的先进功率封装 TO-252-3L 后, 于去年量产时便已达到业界领先的导通阻抗  $R_{DS(ON)}$ 。

目前捷捷微电主要聚焦在消费类、电脑及周边、工业用、通信用、及车用等的终端市场。因为深知产品必需跟应用挂钩, 捷捷微电一直努力贴近市场和客户, 清楚认识那些 SGT MOSFET 的参数和特性, 能让客户的产品兼具高效能和长期可靠性, 同时又保持高性价比。消费者对体积和重量的不断追求, 因而移动 3C 终端的充电器越来越紧凑, 有限的内壳空间使工作温度升高, 造成充电器内部所用器件的稳定性和效能方面的要求极为严苛。JSFET SGT MOSFETs 轻松解决了电路设计工程师所面临, 合理成本和高电源转换效率这两个冲突的难题。JSFET SGT MOSFETs 采用 PDFN3x3 / 5x6-8L、TO-220 / 247 / 251 / 252 / 263-3L、SOP-8L、SOT23-3L/6L 封装, 优化的框架和引接工艺不仅有效地增强热应力处理, 也提升质量和可靠性, 同时符合 RoHS 标准且不含卤素。









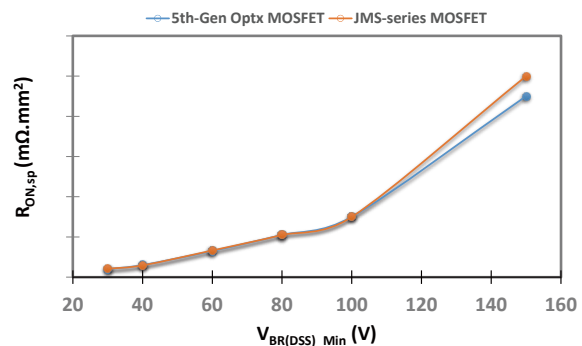
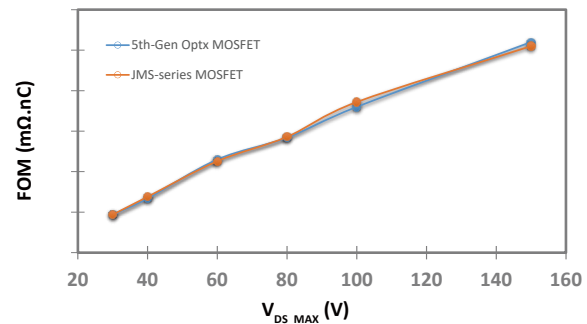
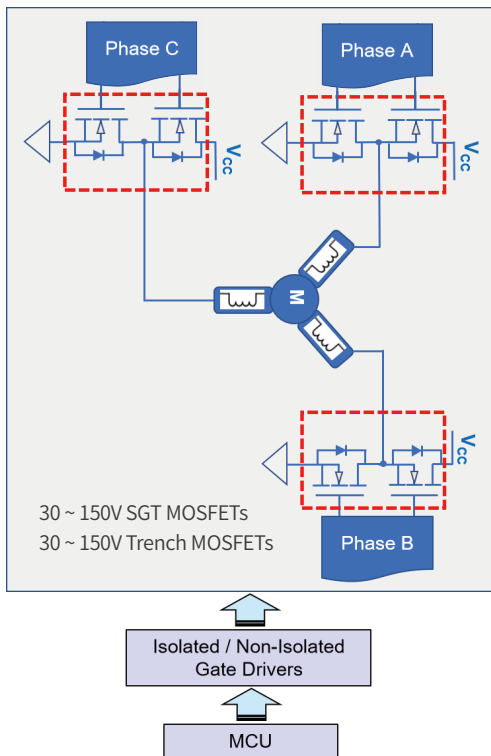
# 电机驱动 BLDC MOTOR DRIVING

捷捷微电 MOSFETs 广泛应用于电机驱动领域 如电动工具、风机、电动自行车、园林工具、吸尘器、电风扇等相关应用, 并具有如下的优势:

- 01 提供更加优的  $R_{DS(ON)}$  及  $E_{AS}$ , 有效降低系统温升和提高抗冲击能力
- 02 产品具有好的高频开关特性, 实现高效率, 有效降低系统温升, 提高系统的可靠性
- 03 耐压 30 ~ 150V  $V_{DS\_Max}$ , 内阻最低可达 0.55m $\Omega$  (JMSL030SAG) 及 0.57m $\Omega$  (JMSL040SAG), FOM 低至 47, 封装类型涵盖 PowerJE<sup>®</sup>10x12、PDFN3x3/5x6-8L、DFN2020-6、TO-220/247/251/252/263-3L、SOP-8L、SOT-23、SOT-23-3/6L 等
- 04 产品参数一致性好, 可靠性高
- 05 产品系列齐全, 可满足各类电机驱动对不同应用空间和规格的需求

MOSFETs (SGT/Trench) from Jiejie Micro. were widely adopted in end-systems in which DC/BLDC motor is an integral part: power tools, e-bikes, garden power tools, home appliances like robot vacuums & venting/cooling fans, etc. JJM's MOSFETs offer the following competitive advantages:

- 01 Excellent  $R_{DS(ON)}$  and  $E_{AS}$  hence exceptional operating temperature and resistance to circuit impairment
- 02 Enable high switching frequency without adversely affecting the operating temperature and reliability
- 03  $V_{DS\_Max}$  from 30V to 150V,  $R_{DS(ON)\_Typ}$  as low as 0.55m $\Omega$  (JMSL030SAG) & 0.57m $\Omega$  (JMSL040SAG), FOM as small as 47, highly thermal efficient packages like PowerJE<sup>®</sup>10x12, PDFN3x3/5x6-8L, DFN2020-6L, TO-220/247/251/252/263-3L, SOP-8L, SOT-23, SOT-23-3/6L
- 04 All key electrical parameters are tested to fit a narrow range hence consistent performance and high reliability
- 05 Comprehensive portfolio of SGT & Trench MOSFETs to meet the most demanding BOM and performance requirement



**新能源自行车电机驱动**  
BLDC Motor Driving in e-Bike  
(18pcs of JM5H1004AC On-board)

## Benchmarking of MOSFETs for BLDC Application

Product Name	Vendor	Package	Configuration	V <sub>DS_Max</sub> (V)	I <sub>D_Max</sub> (A)	R <sub>DS(ON)_Typ</sub> @ V <sub>GS</sub> =10V (mΩ)	R <sub>DS(ON)_Max</sub> @ V <sub>GS</sub> =10V (mΩ)	R <sub>DS(ON)_Typ</sub> @ V <sub>GS</sub> =4.5V (mΩ)	R <sub>DS(ON)_Max</sub> @ V <sub>GS</sub> =4.5V (mΩ)	V <sub>GS_Max</sub> (V)	V <sub>GS(th)_Typ</sub> (V)	E <sub>AS_Max</sub> (mJ)	C <sub>iss_Typ</sub> (pF)	C <sub>oss_Typ</sub> (pF)	C <sub>rss_Typ</sub> (pF)	Q <sub>g_Typ</sub> (nC)	FOM
JMSL030SAG	JJ Micro.	PDFN5x6-8L	N	30	327	1.7	0.55	0.69	0.80	0.99	±20	342	7,543	5,253	422.0	120.0	66
JMSL0302AG	JJ Micro.	PDFN5x6-8L	N	30	178	1.7	1.3	1.6	2.0	2.9	±20	101	2,975	2,650	117.0	39.0	51
NXXFS4C324N	O. Co.	PDFN5x6-8L	N	30	136	1.7	1.4	1.7	2.0	2.4	±20	549	3,071	1,673	67.0	20.8	29
JMTK3002B	JJ Micro.	TO-252-3L	N	30	180	1.5	2.1	2.7	3.5	5.0	±20	324	4,930	682	566.0	70.0	147
JMSL0401AG	JJ Micro.	PDFN5x6-8L	N	40	189	1.5	1.3	1.7	1.7	2.3	±20	163	3,133	1,993	75.0	46.0	60
JMSH0801AS	JJ Micro.	TO-247-3L	N	80	315	2.8	1.3	1.7	-	-	±20	696	12,007	3,462	28.9	190.0	247
JMSH0804BC	JJ Micro.	TO-220-3L	N	85	142	2.8	3.5	4.2	-	-	±20	180	4,060	1,341	9.0	63.0	221
SXX502T	H. Co.	TO-220-3L	N	85	135	3.0	4.6	5.5	-	-	±20	144	3,086	1,057	26.0	55.0	253
JMSH0805AC	JJ Micro.	TO-220-3L	N	85	121	2.8	4.2	5.0	-	-	±20	115	2,451	677	18.0	39.7	167
JMSH1002AC	JJ Micro.	TO-263-3L	N	100	270	2.7	1.8	2.3	-	-	±20	720	9,623	2,091	1.2	155.0	279
JMSH1004AC	JJ Micro.	TO-220-3L	N	100	190	2.7	3.0	3.6	-	-	±20	245	4,398	1,361	8.5	66.0	198
JMSH1004BC	JJ Micro.	TO-220-3L	N	100	139	2.7	3.5	4.2	-	-	±20	151	3,433	905	13.0	57.2	200
JMSH1504AC	JJ Micro.	TO-220-3L	N	150	185	3.2	4.2	5.2	-	-	±20	889	6,540	772	6.7	88.0	370

# ▶▶ 电池管理系统 BMS

随着社会生活水平日益发展, 电池包 (Battery Pack) 已充分呈现于人们日常生活中。在手机、智能穿戴、笔电、电动玩具、扫地机器人、电动非机动车、电动工具、无人机、机器人、移动电源、便携式储能器、新能源车等终端里, 电池包都不可或缺。电池管理系统 (BMS) 是决定电池包性能和效能的关键系统, 它的主要运作是: 实时采集、处理、存储电池组运行过程中的关键信息, 然後与外部设备交换信息; 过程中同时需要解决电池包里, 每组单元在安全性、可用性、工作寿命、放电时平衡负载、因应电池的材料特性有序无误地快速充电等带来的问题。

捷捷微电提供的中、低压功率MOSFETs, 广泛应用于上述终端里的电池管理系统 (BMS), 具有以下特性和独特优点:

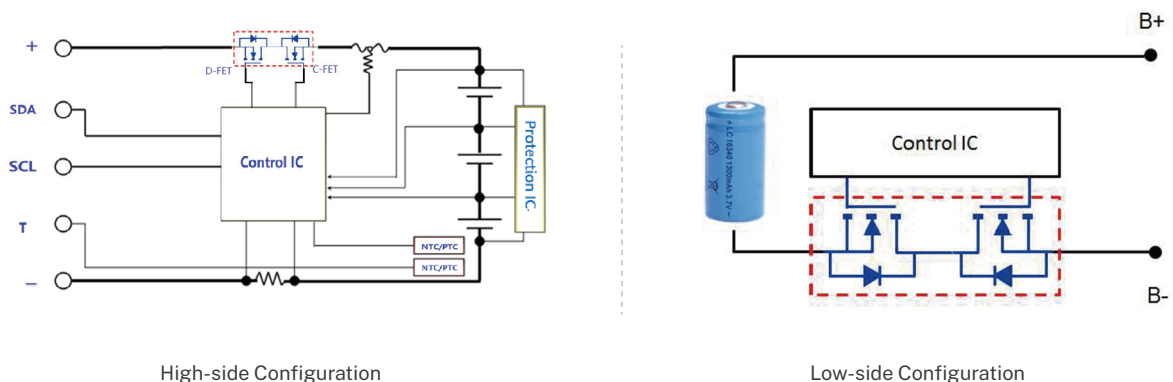
- 01 单位元胞尺寸小于  $1\mu\text{m}$ , 芯片面积积极小化, 提高器件集成度
- 02 内阻及栅极电荷低, 器件导通及开关损耗优异
- 03 阈值电压一致性好, 生产时分档处理以支持多管并联应用
- 04 UIS 雪崩击穿能力高, 生产时100% 最后筛测
- 05 封装热阻低, 大电流持续加载能力强

With the increasing adoption of 3C digital products in our daily livings, battery pack (BP) is embedded in many end products (portable or stationary) which we use. BP is indispensable in smartphones, smart wearables (TWS earphones, wristbands, watches, etc.), toys, robotic vacuum, electric bicycle, power tools, unmanned aerial vehicles (drones), portable battery packs & power station, new energy vehicles (BEV, HEV, FCEV etc.). Inside the BP, Battery Management System (BMS) is often the critical sub-system which determines the performance and power efficiency. BMS is responsible for the following operations: real-time data collection and analytics of the key parameters of the individual battery cells before communicating the effect with internal or external units. Along the way, issues concerning safety, usability, cycle time, load balancing during discharge, and fast re-charging must be handled in timely and orderly manner.

The power MOSFETs from JieJie Microelectronics Co., Ltd. are widely adopted in the BMS of the 3C digital products mentioned beforehand. They offer the following performance characteristics and benefits:

- 01 Small cell pitch size (can be far less than  $1\mu\text{m}$ ) good for high system-in-package integration
- 02 Low ON-resistance ( $R_{\text{DS(ON)}}$ ) and gate charge ( $Q_g$ ) resulting in low conduction and switching losses
- 03 Highly consistent gate threshold voltage ( $V_{\text{GS(th)}}$ ) together with binning in final test enabling multiple devices connected in parallel to supply large current
- 04 High UIS avalanche breakdown capability with 100% tested in the manufacturing stage
- 05 Thermally efficient packages allowing for continuous high current for heavy load

## Application of MOSFETs in BMS



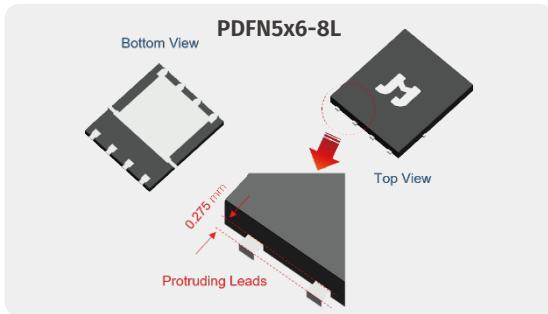


客户端 BMS 应用  
BMS in Li-Ion Battery Pack  
6pcs of JMTK3005 On-board

## Benchmarking of MOSFETs for BMS Application

Product Name	Package	Configuration	V <sub>DS_Max</sub> (V)	I <sub>D_Max</sub> (A)	V <sub>GSth_Typ</sub> (V)	R <sub>DS(ON)_Typ</sub> @ V <sub>GS</sub> =10V (mΩ)	R <sub>DS(ON)_Max</sub> @ V <sub>GS</sub> =10V (mΩ)	R <sub>DS(ON)_Typ</sub> @ V <sub>GS</sub> =4.5V (mΩ)	R <sub>DS(ON)_Max</sub> @ V <sub>GS</sub> =4.5V (mΩ)	R <sub>DS(ON)_Typ</sub> @ V <sub>GS</sub> =2.5V (mΩ)	R <sub>DS(ON)_Max</sub> @ V <sub>GS</sub> =2.5V (mΩ)	V <sub>GS_Max</sub> (V)	E <sub>AS_Max</sub> (mJ)	C <sub>iss_Typ</sub> (pF)	C <sub>oss_Typ</sub> (pF)	C <sub>rss_Typ</sub> (pF)	Q <sub>g_Typ</sub> (nC)	FOM
JMTK90N02A	TO-252-3L	N	20	90	0.7	-	-	2.8	4.0	4.0	6.0	±12	110	3,200	460	445	-	-
JMTK75N02A	TO-252-3L	N	20	75	0.7	-	-	4.1	5.0	6.5	9.0	±12	56	2,500	407	386	-	-
JMTK3002B	TO-252-3L	N	30	180	1.5	2.1	2.7	3.5	5.0	-	-	±20	324	4,930	682	566	-	-
JMTK3003A	TO-252-3L	N	30	150	1.6	2.5	3.3	4.5	6.5	-	-	±20	225	3,500	500	431	-	-
JMTK3004A	TO-252-3L	N	30	100	1.5	2.9	4.0	4.8	6.5	-	-	±20	121	2,680	393	330	-	-
JMTK3005A	TO-252-3L	N	30	90	1.5	3.3	4.5	6.7	9.5	-	-	±20	95	2,100	326	282	-	-
JMTK3006B	TO-252-3L	N	30	70	1.5	4.8	6.0	7.5	12.0	-	-	±20	56	1,614	245	215	-	-
JMTK80N06A	TO-252-3L	N	60	80	3.0	5.3	7.0	-	-	-	-	±20	169	4,136	286	257	-	-
JMTK58N06B	TO-252-3L	N	60	58	1.7	7.5	10.0	10.0	14.0	-	-	±20	110	4,400	210	190	-	-
JMSH0804AE	TO-263-3L	N	85	139	2.8	3.6	4.5	-	-	-	-	±20	180	3,783	1,373	22	63	227
JMSH0804BES	TO-263-3L	N	85	132	2.8	4.0	5.0	-	-	-	-	±20	180	2,083	1,142	18	35	140
JMSH0805AE	TO-263-3L	N	85	121	2.8	4.2	5.0	-	-	-	-	±20	115	2,451	677	18	40	168
JMSH1002AE	TO-263-3L	N	100	270	2.7	1.6	2.0	-	-	-	-	±20	720	9,623	2,091	1	155	248
JMSH1002BE	TO-263-3L	N	100	258	2.7	2.1	2.6	-	-	-	-	±20	694	7,011	1,512	5	102	214
JMSH1004AE	TO-263-3L	N	100	190	2.7	3.0	3.6	-	-	-	-	±20	245	4,398	1,361	9	66	198
JMSH1004BE	TO-263-3L	N	100	139	2.7	3.5	4.2	-	-	-	-	±20	151	3,433	905	13	57	200
JMSH1008AE	TO-263-3L	N	100	95	2.8	6.8	8.0	-	-	-	-	±20	101	1,920	445	7	30	204
JMSH1305AE	TO-263-3L	N	135	147	3.0	4.3	5.0	-	-	-	-	±20	540	4,307	611	4	61	262
JMSH1504AE	TO-263-3L	N	150	185	3.2	3.9	4.9	-	-	-	-	±20	889	6,540	772	7	88	343
JMSH1507AE	TO-263-3L	N	150	115	3.0	5.2	6.5	-	-	-	-	±20	540	4,320	535	7	68	354
JMSH1509AE	TO-263-3L	N	150	90	3.0	9.0	10.9	-	-	-	-	±20	211	3,609	348	5	47	423
JMSH1516AE	TO-263-3L	N	150	61	3.2	14.5	16.9	-	-	-	-	±20	135	1,603	196	8	23	334

## 新一代 P-沟道 JPFET® 搭配先进 PDFN 封装成就国际领先性能

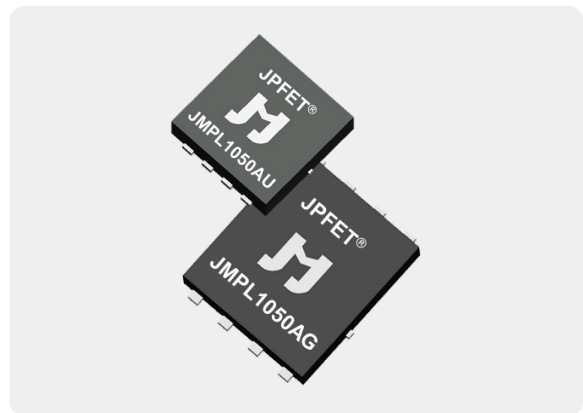


2022年7月1日 捷捷微电 特此专题推出新一代100V P沟道SGT MOSFET, 比起上一代设计, FOM性能改善20%, 实现国际领先。先进PDFN3x3-8L及PDFN5x6-8L薄型封装, 比传统SOP-8L及DPAK封装, 面积缩小64%及48%, 高度降低45%及55%, 极为适合紧凑型终端设计。同时, PDFN5x6-8L的引脚具低应力且长达0.275mm, 极大程度地改善自动光学检测 (AOI) 印刷电路板组装 (PCBA) 的焊点良率, 进一步保证终端的稳定工作和长期可靠性。

Product Name	Company	JJM Package	Compatible Industry-common Package	$V_{DS-Max}$ (V)	$I_{D-Max}$ (A)	$V_{GS(th)-Typ}$ (V)	$R_{DS(ON)-Typ}$ @ $V_{GS}=10V$ (mΩ)	$R_{DS(ON)-Max}$ @ $V_{GS}=10V$ (mΩ)	$V_{GS-Max}$ (V)	$E_{AS-Max}$ (mJ)	$C_{iss-Typ}$ (pF)	$Q_g-Typ$ (nC)	FOM
JMPL1050AU	JJM	PDFN3x3-8L	PQFN3x3	-100	-26.0	-2.0	38.0	50.0	±20	109	1,412	20.0	760
Sxxx71DN	US-Vxxx		PowerPAK1212-8S	-100	-23.0	-2.0	47.0	59.0	±20	31	1,050	20.0	940
Fxxx86139P	US-xxxx		WDFN8 3.3x3.3	-100	-15.0	-3.0	56.0	67.0	±25	121	1,001	16.0	896
JMPL1050AG	JJM	PDFN5x6-8L	SupperS08	-100	-27.0	-2.0	36.0	50.0	±20	109	1,412	20.0	720
JMPL1050AK	JJM	TO-252-3L	DPAK	-100	-30.0	-2.0	37.0	50.0	±20	109	1,412	20.0	740
JMPL1050AY	JJM	SOT-223-3L	SOT-223	-100	-9.7	-2.0	40.0	52.0	±20	109	1,412	20.0	800
JMPL1050AP	JJM	SOP-8L	SOP-8	-100	6.3	-2.0	36.0	50.0	±20	109	1,412	20.0	720

100V P沟道 MOSFET 的驱动电路相比N沟道MOSFET更加简单, 满足超性能运算 (HPC)、工业5.0 (IE)、车载电子 (Autonomous Driving System, ADS) 后装市场的「高端负载、防反接电路、电池反向保护、DC 电机驱动、DC-DC降压转换的高边开关」等应用对系统长期稳定运作, 狭窄应用空间、及减少电路关键故障点的不断需求。

新一代P沟道 JPFET®性能达国际领先水平, 主要电气参数如 $R_{DS(ON)-Typ}$ 和FOM均优于国际一线半导体 IDM 同类产品。其中JMPL1050AU采用薄小型PDFN3x3-8L封装, 在 $V_{GS}=10V$ 条件下, 器件的 $R_{DS(ON)-Typ}$ 及FOM测量值分别低至38mΩ / 760, 均为国际领先水平。此外, 一流的线性模式 / 安全工作区 (SOA) 特性, 使器件在大电流的工作状态下, 仍能实现安全可靠的运作。极低的导通电阻有助于提高运行效能, 降低系统成本, 并延长器件的使用寿命。



捷捷微电 功率MOSFET市场总监 樊君:「新一代的P沟道 JPFET 系列, 提供插件式和新型贴片式两类高质量封装, 完美满足客户在 40 ~ 72V 等工作电压的应用。在占空比少于30%的DC-DC降压转换中, JMPL1050AU应该是当下业界在高电能转换效率、简单驱动电路、PCBA、长期安全可靠性能各方面考量下, 最好的选择之一。捷捷微电将持续开发多个耐压范围、性能优越的P 沟道 SGT MOSFETs, 以满足新能源、超性能运算和车载电子等终端对功率器件的需求。」

- 捷捷微电销售部
- 合约代理商
- 相关商务渠道

目前新一代P沟道 JPFET® 已规模量产, 样品可向 捷捷微电 销售部、合约代理商、或相关商务渠道申请。产品规格书, 辅助系统电路设计的资料如 POD (package outline drawing)、仿真模型 H-Spice 及 P-Spice 等具体信息, 均可直接在官网浏览或下载 <https://www.jjwdz.com/product/103/>

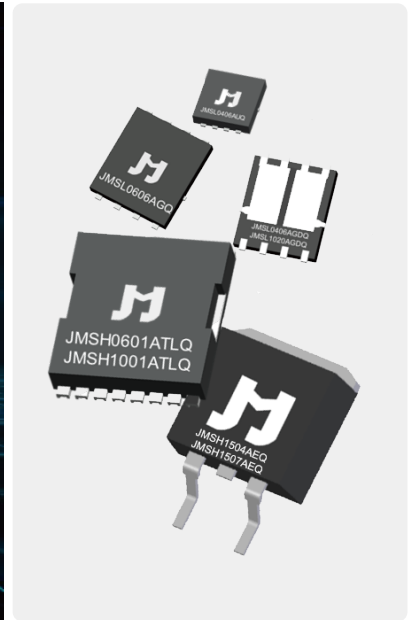
# 领先产品介绍 LEADING PRODUCT INTRODUCTION

## 47 款车规级 40~150V N-沟道 JSFET®

广泛应用于汽车市场

47 Auto-grade 40~150V N-ch JSFET®

Increasingly Found Homes in Automobiles



这47款汽车等级SGT MOSFETs, 芯片的设计制造及成品的封装测试, 皆在符合 IATF 16949 品质管理的工厂完成。每个器件也通过三批次、符合 AEC-Q101 标准的长期可靠性验证。优异的关键电气参数如导通电阻 (0.58 ~ 29.0mΩ)、栅极电荷 (6.8 ~ 155.0nC)、FOM (55 ~ 354) 等, 性能不输欧美大厂, 已广泛被汽车前装及后装市场接受並大规模出货。

Of these 47 auto-grade devices, the dies inside and the A/T were all produced at manufacturing sites certified for IATF 16949. All devices passed the AEC-Q101 compliant tests. Outstanding electrical characteristics like  $R_{DS(ON)}$  of 0.58 ~ 29.0mΩ,  $Q_g$  of 6.8 ~ 155.0nC, FOM of 55 ~ 354 ensure reliable operation in harsh operating environment.

为实现与先进芯片的有机匹配, 保证性能与高可靠性, 在 -55 ~ 175°C 温度区间内保持长期稳定工作, PowerJE®10x12, PDFN3x3/5x6-8L/-D及 TO-252/263-3/7L的封装, 从框架到贴芯工艺、线材、焊接工艺等, 均采用 MSL1 等级及低机械温度应力材料。所有车规级SGT MOSFETs 皆不含卤素, 且符合 RoHS 要求。

In the thermally efficient SM-type PowerJE®10x12, PDFN3x3 / 5x6-8L/-D, TO-252/263-3/7L, materials used (lead frame, solder, epoxy, etc.) and the manufacturing steps (wire/clip bonding, die-attach, polyimide over die-top, etc.) are of MSL1 to minimize mechanical thermal stress. As such, stable operation over  $T_j = -55 \sim 175^\circ\text{C}$  are resulted. All devices shipped are halogen-free & RoHS-compliant.

### Key Aspects of 40~150V Q-grade JSFET®

#### Parametric Performance to Meet the Challenge

Exceptional  $R_{DS(ON)_{Typ}}$  at down to 0.58mΩ, FOM as small as 55,  $E_{AS_{Max}}$  as high as 1,634mJ lead to reliable operation under the harsh working environment typical of automobiles.

#### Unclamped Inductive Switching Tested

Fully UIS tested during production to confirm the device's ability to withstand the avalanche energy common in both resistive and inductive type of loads.

#### Robustness & Long-term Reliability

All devices passed the stringent AEC-Q101 qualification @ 3 lots &  $T_j = 175^\circ\text{C}$ . Wafer and A/T production facilities are IATF 16949 certified for quality management.

#### Robust & Thermal Efficient Packages

SM-type PowerJE®10x12, PDFN3x3/5x6-8L/-D, TO-252-3L, TO-263-3/7L with high immunity to thermal-mechanical stress enable reliable operation under excessively low / high ambient temperature

## Market Applications

- 01** DC/DC boost for mini/LED backlighting in infotainment, LED driving in matrix headlights

直流升压驱动: 资讯娱乐面板内 mini/LED 背光、内饰环境 LED、矩阵 LED 车前照灯

- 03** High/Low-side switching in POL DC/DC (e.g. HPC for automotive gateway & domain controller, SR rectification in OBC)

高/低侧电源开关: 车载高性能运算 (GW, DC/DC)、副边同步整流

- 05** Load switching in various vehicle electrical systems of ICE-based and new-energy PHEV / BEV

负载开关: 传统及新能源车的各种母线系统的电子设备

- 02** Power stages for low / medium-power BLDC/DC motor driving in BCM (body control module) & fuel pump & EPS (electronic power steering), wireless charging

半/全桥功率级: 小/中功率 DC 及 BLDC 马达驱动 (车身控制模组、油泵、电子助力转向)、Qi 兼容无线充电板

- 04**  $V_{BUS}$  power switch for USB PD 3.0/3.1 compatible DC output via USB Type-C® connectors

USB PD 3.0/3.1兼容 USB Type-C® 电源输出端:  $V_{BUS}$  输出开关

## Application Circuits

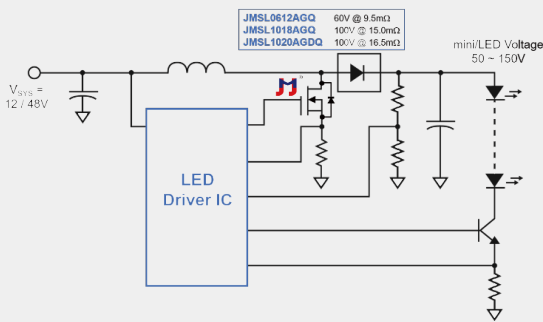


Figure 1: DC/DC Boost in mini/LED Backlighting

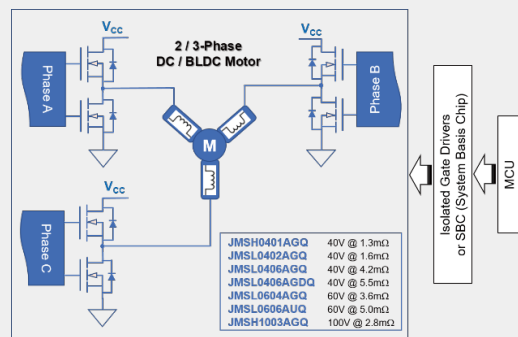


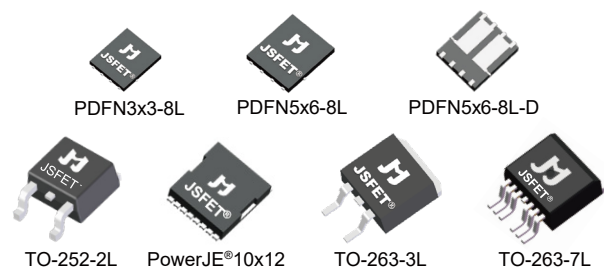
Figure 2: DC/BLDC Motor Driving

These 40 ~ 150V SGT MOSFETs are well suited for applications inside automobiles. Their long-term reliability were tested per AEC-Q101 quality standards. JMSL0406AGQ and its dual-die variant JMSL0406AGDQ are popular in body control module (BCM) for use cases like low-power DC motor driving. With  $R_{DS(ON)}$  down to 1.3m $\Omega$ , JMSH041AGQ fits the power efficiency requirement of mid/high-power DC motors. Typical applications are: multi-way power seat, power tailgate, centralized door lock, ESC (electronic stability control). At  $V_{DS\_Max} = 100V$  and assembled in the low-profile PDFN5x5-8L package, JMSL1018AGQ is good for LED backlighting in flat panel display of the infotainment/ADAS unit. In contrast, JMSL1020AGDQ drives two strings of high-brightness LEDs simultaneously for backlighting in larger panel.

## Shipping Information

Package	# of Pins	Media	Quantity (pcs)
PowerJE®10x12	8	13-inch Reel	2000
PDFN3x3-8L	8	13-inch Reel	3,000
PDFN5x6-8L	8	13-inch Reel	3,000
PDFN5x6-8L-D	8	13-inch Reel	3,000
TO-252-3L	3	13-inch Reel	3,000
TO-263-3L	3	13-inch Reel	800
TO-263-7L	7	13-inch Reel	800

Samples & production quantities of the Q-grade 40-150V JSFET are available from sales\_sh@jwwdz.com and authorized sales distributors.

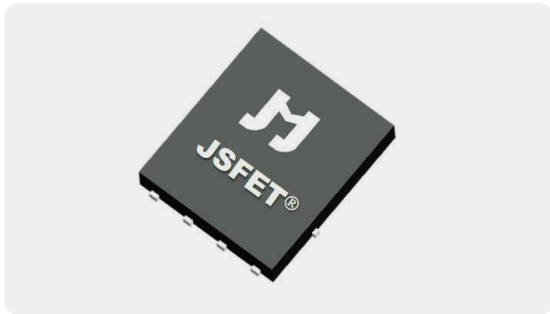


## Product Portfolio

Product Name	Technology	Package	Configuration	V <sub>DS-Max</sub> (V)	I <sub>D,Max</sub> (A)	R <sub>DS(ON),Typ</sub> @V <sub>GS=10V</sub> (mΩ)	R <sub>DS(ON),Max</sub> @V <sub>GS=10V</sub> (mΩ)	V <sub>GS,Max</sub> (V)	V <sub>GS(th),Typ</sub> (V)	E <sub>AS,Max</sub> (mJ)	C <sub>iss,Typ</sub> (pF)	C <sub>oss,Typ</sub> (pF)	C <sub>rss,Typ</sub> (pF)	Q <sub>G,Typ</sub> (nC)	FOM
JMSH0601ATLQ	SGT	PowerJE®10x12	N	60	348	1.2	1.6	±20	2.8	480.0	7,312	2239.0	53.0	102.0	122
JMSH1001ATLQ	SGT	PowerJE®10x12	N	100	348	1.3	1.6	±20	2.8	512.0	9,623	2091.0	1.2	155.0	202
JMSL0406AUQ	SGT	PDFN3x3-8L	N	40	57	4.5	5.6	±20	1.6	36.0	1,204	536.0	51.0	17.9	81
JMSL0606AUQ	SGT	PDFN3x3-8L	N	60	59	5.0	6.2	±20	1.6	94.0	2,122	440.0	4.8	32.0	160
JMSL0609AUQ	SGT	PDFN3x3-8L	N	60	44	7.5	9.4	±20	1.6	34.0	1,087	309.0	8.5	16.6	125
JMSL0612AUQ	SGT	PDFN3x3-8L	N	60	36	10.0	12.5	±20	1.6	20.0	731	224.0	7.4	13.9	139
JMSL1018AUQ	SGT	PDFN3x3-8L	N	100	29	16.2	20.0	±20	1.8	29.0	769	171.0	5.1	12.7	206
JMSL1040AUQ	SGT	PDFN3x3-8L	N	100	20	29.0	39.0	±20	1.8	14.0	363	85.0	3.0	6.8	197
JMSL040SAGQ	SGT	PDFN5x6-8L	N	40	387	0.58	0.75	±20	1.5	506.0	7,654	3738.0	44.0	114.0	66
JMSL0401BGQ	SGT	PDFN5x6-8L	N	40	299	0.83	0.98	±20	1.5	726.0	5,495	3347.0	44.0	80.0	66
JMSH0401BGQ	SGT	PDFN5x6-8L	N	40	276	0.90	1.1	±20	2.8	441.0	5,280	3405.0	71.0	68.0	61
JMSL0401AGQ	SGT	PDFN5x6-8L	N	40	198	1.3	1.7	±20	1.6	194.0	3,125	1607.0	18.0	47.0	61
JMSH0401AGQ	SGT	PDFN5x6-8L	N	40	197	1.3	1.7	±20	2.8	194.0	3,015	2000.0	18.0	42.0	55
JMSL0402AGQ	SGT	PDFN5x6-8L	N	40	183	1.6	2.0	±20	1.6	163.0	3,133	1993.0	75.0	46.0	74
JMSL0406AGQ	SGT	PDFN5x6-8L	N	40	90	4.2	5.2	±20	1.6	36.0	1,204	536.0	51.0	17.9	75
JMSL0601BGQ	SGT	PDFN5x6-8L	N	60	252	1.3	1.6	±20	1.6	1,634.0	4,685	1429.0	40.0	75.0	94
JMSH0601AGQ	SGT	PDFN5x6-8L	N	60	225	1.3	1.7	±20	2.8	375.0	5,874	1375.0	45.0	81.0	105
JMSL0602AGQ	SGT	PDFN5x6-8L	N	60	172	1.8	2.3	±20	1.7	240.0	2,880	958.0	44.0	48.0	86
JMSH0602AGQ	SGT	PDFN5x6-8L	N	60	168	1.9	2.4	±20	2.8	240.0	3,562	896.0	43.0	50.0	95
JMSL0603BGQ	SGT	PDFN5x6-8L	N	60	147	2.4	3.0	±20	1.6	338.0	3,174	872.0	39.0	51.0	122
JMSL0604AGQ	SGT	PDFN5x6-8L	N	60	112	3.6	4.5	±20	1.6	94.0	2,030	445.0	4.4	32.0	115
JMSL0606AGQ	SGT	PDFN5x6-8L	N	60	103	4.0	5.0	±20	1.6	94.0	2,030	445.0	4.4	32.0	128
JMSL0609AGQ	SGT	PDFN5x6-8L	N	60	67	7.2	9.4	±20	1.6	34.0	1,087	309.0	8.5	16.6	120
JMSL0612AGQ	SGT	PDFN5x6-8L	N	60	52	9.5	12.0	±20	1.6	20.0	731	224.0	7.4	13.9	132
JMSH1003AGQ	SGT	PDFN5x6-8L	N	100	170	2.8	3.5	±20	2.7	346.0	4,374	1140.0	4.7	70.0	196
JMSH1004BGQ	SGT	PDFN5x6-8L	N	100	138	3.3	4.3	±20	2.7	231.0	3,434	906.0	14.0	57.0	188
JMSL1006AGQ	SGT	PDFN5x6-8L	N	100	110	4.7	5.9	±20	1.8	110.0	2,604	567.0	9.6	42.0	197
JMSL1008AGQ	SGT	PDFN5x6-8L	N	100	88	6.0	7.6	±20	1.8	102.0	2,200	445.0	8.0	34.0	204
JMSH1008AGQ	SGT	PDFN5x6-8L	N	100	87	6.2	7.8	±20	2.7	144.0	1,920	445.0	7.0	30.0	186
JMSH1018AGQ	SGT	PDFN5x6-8L	N	100	45	15.8	19.8	±20	2.7	39.0	769	171.0	5.1	12.7	201
JMSL1010AGQ	SGT	PDFN5x6-8L	N	100	68	8.0	10.0	±20	1.9	94.0	1,535	335.0	8.2	26.0	208
JMSH1010AGQ	SGT	PDFN5x6-8L	N	100	64	8.8	11.0	±20	2.7	94.0	1,372	291.0	6.2	21.0	185
JMSL1018AGQ	SGT	PDFN5x6-8L	N	100	47	15.0	18.7	±20	1.8	29.0	769	171.0	5.1	12.7	191
JMSL1040AGQ	SGT	PDFN5x6-8L	N	100	27	29.0	36.0	±20	1.8	14.0	363	85.0	3.0	6.8	197
JMSH1509AGQ	SGT	PDFN5x6-8L	N	150	87	8.5	9.9	±20	3.2	331.0	2,181	363.0	7.9	30.0	255
JMSH1535AGQ	SGT	PDFN5x6-8L	N	150	29	27.0	35.0	±20	3.3	48.0	760	113.0	23.0	12.3	332
JMSL0406AGDQ	SGT	PDFN5x6-8L-D	N+N	40	49	5.5	6.9	±20	1.6	36.0	1,227	526.0	55.0	17.9	98
JMSL0610AGDQ	SGT	PDFN5x6-8L-D	N+N	60	38	8.5	10.6	±20	1.6	34.0	1,087	309.0	8.5	16.6	141
JMSL0615AGDQ	SGT	PDFN5x6-8L-D	N+N	60	33	10.5	13.5	±20	1.6	20.0	731	224.0	7.4	13.9	146
JMSL1020AGDQ	SGT	PDFN5x6-8L-D	N+N	100	27	16.5	20.0	±20	1.8	29.0	769	171.0	5.1	12.7	210
JMSL0406AKQ	SGT	TO-252-3L	N	40	78	4.7	5.6	±20	1.6	36.0	1,204	536.0	51.0	17.9	84
JMSL0606AKQ	SGT	TO-252-3L	N	60	93	4.6	5.8	±20	1.6	94.0	2,122	440.0	4.4	32.0	147
JMSH1504AEQ	SGT	TO-263-3L	N	150	210	3.9	4.9	±20	3.2	889.0	6,540	772.0	6.7	88.0	343
JMSH1507AEQ	SGT	TO-263-3L	N	150	161	5.2	6.5	±20	3.2	540.0	4,320	535.0	7.2	68.0	354
JMSH1508AEQ	SGT	TO-263-3L	N	150	117	6.7	8.4	±20	3.2	265.0	3,395	457.0	17.0	47.0	315
JMSH1003AE7Q	SGT	TO-263-7L	N	100	196	2.8	3.5	±20	2.7	406.0	4,398	1361.0	8.5	66.0	185
JMSH1004BEQ	SGT	TO-263-7L	N	100	160	3.5	4.2	±20	2.7	304.0	3,433	905.0	13.0	57.0	200

## 捷捷微电 推出业界前列超低导通阻抗 30V JSFET

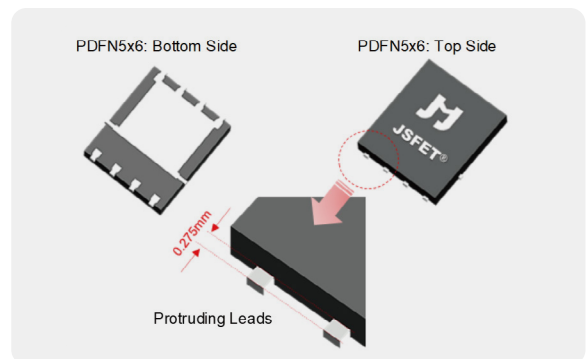
满足超高功率密度和能效需求



2021年8月6日 - 捷捷微电 推出新款30V N-沟道JSFET<sup>®</sup>, 用以符合电源及电机类应用、反向电池保护等对超高功率密度和能效的需求。JMSL030SAG采用紧凑且具高可靠性的PDFN5x6-8L封装, 内部配以全铜框架及夹片, 把杂生电感降至最低的同时, 超优的热导性能可减少热点, 改善器件的雪崩能量 ( $E_{AS}$ )。在 $V_{GS}=10V$ 条件下, 标准导通阻抗仅为0.55m $\Omega$ , 达国内领先水平, 与欧美日半导体IDM大厂的同类产品不相伯仲。

Bench-marking	Company	Package	$V_{DS\_Max}$ (V)	$R_{DS(ON)\_Typ}$ @ $V_{GS}=10V$ (m $\Omega$ )	$R_{DS(ON)\_Max}$ @ $V_{GS}=10V$ (m $\Omega$ )	$C_{iss}$ (pF)	$Q_g$ (nC)	FOM
JMSL030SAG	Jielie Micro.	PDFN5x6-8L	30	0.55	0.69	7,543	120	66
BSx005N03Lxx	EU - Inxx	TDSO8-8	30	0.48	0.55	8,900	122	59
NTxxx4C020N	US - Onxx	DFN5 5x6	30	0.56	0.67	10,144	139	78
PSxxx58-30Yxx	CN - Nexx	LFPK56E	30	0.54	0.67	6,912	114	62
CSx17570Q5B*	US - Texx	SON 5x6	30	0.56	0.69	10,400	185	104
Sixx90Axx	US - Vixx	PDFN5x6	30	0.62	0.78	9,120	130	81

新的 SGT MOSFET 功率器件与最接近的 DPAK 和 D<sup>2</sup>PAK 封装竞品相比, 占位面积分别减少 50% 及 76%。与同类采用 5mmx6mm 封装的竞品相比, 不单在导通阻抗和输入电容两个参数方面大有优势; 具业界领先的线性模式/安全工作区域 (SOA) 特性, 亦可以在大电流条件下安全可靠地开关工作。PDFN5x6-8L 封装的引脚, 具低应力而且长达 0.275mm, 比欧美同类产品高出 2.2 倍多, 极大程度地改善自动光学检测线路板上焊点良率。捷捷微电功率 MOSFET 器件市场经理樊君:「JMSL030SAG 是捷捷微电继上一代国内  $R_{ON,sp}$  最先进的 JMSL0302AU 后, 结合先进的全铜和长引脚封装工艺, 把性能更推高至全球第一梯队。有信心它可以在客户的设计基础上, 助力优化功率密度、温升、能效、和生产良率等。」



JMSL030SAG 能满足消费类、工业类、及车用类后装等应用对器件牢固性和可靠性的需求。在数据中心、5G 数据交换站、安防系统伺服器里用作存储数据的固态硬盘, 在维修及正常运作时, 常常需要被热插拔。接合处 e-Fuse 内含 JMSL030SAG, 其超低导通阻抗及  $Q_g$  既可把正常工作能耗降至最低, 也能轻松的处理电源关断时出现的尖峰电压。

- 捷捷微电销售部
- 合约代理商
- 相关商务渠道

目前 JMSL030SAG 经已量产, 样品可从捷捷微电销售部、合约代理商、或相关商务渠道申请。产品规格书, 辅助系统电路设计的封装资料如 POD (package outline drawing) 及仿真模型如 H-Spice、P-Spice、长期可靠性报告等具体信息, 均可直接在官网浏览或下载 <https://www.jjwdz.com/product/100/>

# 领先产品介绍 LEADING PRODUCT INTRODUCTION

## 100V系列 N-沟道 JSFET®

满足多领域应用

100V-series JSFET® Well Suited for Applications in Diverse Market Segments



### Optimized ON-state Resistance & Gate Charge

$R_{DS(ON)}$  @  $V_{GS}=10V$  at 1.3 ~ 9.4mΩ ensures that conduction loss is kept to a minimum. With  $Q_g$  as low as 21nC, the resulting figure-of-merit (FOM) at 185 ~ 261 offers reliability and robustness during operation.

### Thermally Efficient & Diverse Packages

Through-hole packages TO-220 / 251-3L and surface-mounted packages TO-252 / 263-3L & PDFN5x6-8L / PowerJE®10x12 optimized to keep the thermal resistance and stray inductance minimal.



### Low Capacitance & Variable Gate Threshold Voltage

Wide range of  $C_{oss}$  (down to 291pF) and  $C_{rss}$  (down to 4.7pF) enable soft/hard switching.  $V_{GS(th)}$  at either 1.2 ~ 2.5V to allow logic-level (1-cell battery) gate driving or at 2.0 ~ 4.0V to allow standard-level (interference free) gate driving.

### Unclamped Inductive Switching Tested

Fully UIS tested during production to confirm the device's ability to withstand the avalanche energy commonly found in inductive loads.

## Market Applications

**01** Motor drive control in power tools, industrial equipment, e-bikes, pumps & actuators in HEV / BEV / FCEV

电机驱动 - 电动工具、工业设备、电动自行车、HEV / BEV / FCEV 里的泵及制动器

**03** Load balancing in battery management system (BMS) of consumer and industrial vehicles

电源开关 - 家用及工业汽车电池管理系统 (BMS)

**05** Backlighting in FPTV

LED 背光驱动 - FPTV

**02** Power management & OR-ing in the power sub-systems of data centers and telecommunications units

电源管理、OR-ing - 电信及数据中心电源

**04** Synchronous rectification in secondary-side of AC/DC conversion

次级同步整流 - AC/DC 电源转换

**06** Micro-inverting in solar power systems

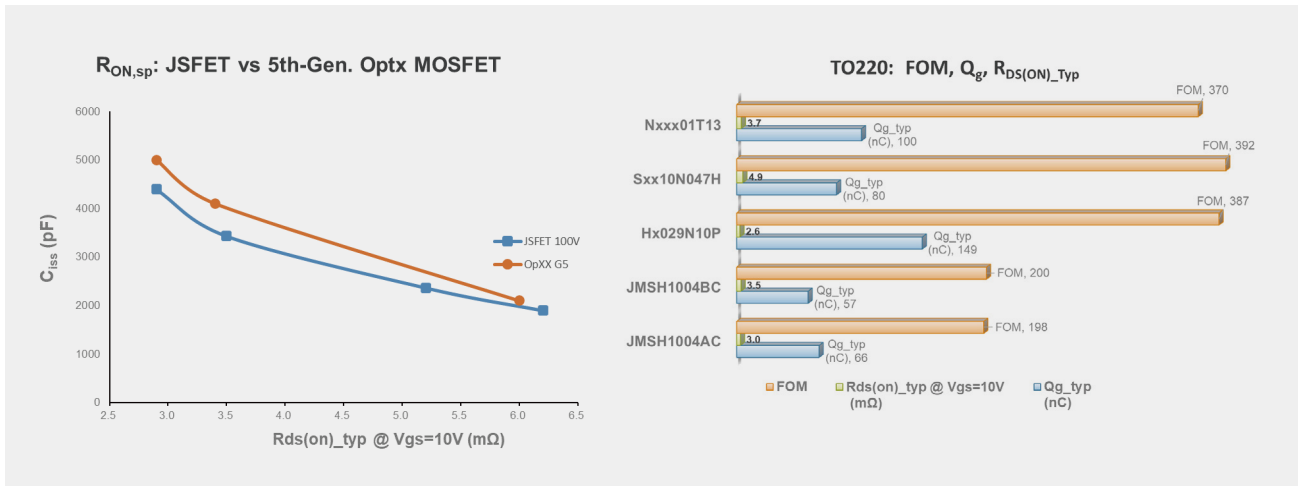
微逆变 - 太阳能电源

## Product Portfolio

For more information, please visit <http://www.jjwdz.com>.

Product Name	Package	V <sub>DS,Max</sub> (V)	I <sub>D,Max</sub> (A)	R <sub>DS(ON)_Typ</sub> @ V <sub>GS</sub> =10V (mΩ)	R <sub>DS(ON)_Max</sub> @ V <sub>GS</sub> =10V (mΩ)	V <sub>GS,Max</sub> (V)	V <sub>GS(th)_Typ</sub> (V)	E <sub>AS,Max</sub> (mJ)	C <sub>res_Typ</sub> (pF)	C <sub>oss_Typ</sub> (pF)	C <sub>rss_Typ</sub> (pF)	Q <sub>g_Typ</sub> (nC)	FOM	
JMSH1001ATL	PowerJE®10x12	100	375	2.8	1.3	1.6	±20	1,250	9,623	2,091	1.2	155.0	202	
JMSH1002AC	TO220-3L	100	270	2.7	1.8	2.3	±20	720	9,623	2,091	1.2	155.0	279	
JMSH1002AE	TO263-3L	100	270	2.7	1.6	2.0	±20	720	9,623	2,091	1.2	155.0	248	
JMSL1003AG	PDFN5x6	100	135	1.6	2.8	3.4	±20	259	4,646	1,214	5.8	78.0	218	
JMSH1003AG		100	144	2.7	2.8	3.5	±20	238	4,374	1,140	4.7	70.0	196	
JMSL1004BG		100	117	1.7	3.4	4.1	±20	205	3,709	873	6.7	62.0	211	
JMSH1004BG		100	112	2.7	3.3	4.3	±20	231	3,434	906	14.0	57.0	188	
JMSH1006AG		100	102	2.7	5.3	6.6	±20	110	2,369	545	11.6	38.0	201	
JMSL1008AG		100	93	1.7	6.0	7.6	±20	101	2,200	445	8.0	34.0	204	
JMSH1008AG		100	92	2.8	6.2	7.8	±20	101	1,920	445	7.0	30.0	186	
JMSL1010AG		100	58	1.9	8.0	10.0	±20	94	1,535	335	8.2	26.0	208	
JMSH1004AC		TO220-3L	100	190	2.7	3.0	3.6	±20	245	4,398	1,361	8.5	66.0	198
JMSH1004BC			100	139	2.7	3.5	4.2	±20	304	3,433	905	13.0	57.2	200
JMSH1006AC	100		114	2.7	5.2	6.4	±20	130	2,369	545	11.6	38.0	198	
JMSH1008AC	100		95	2.8	6.8	8.0	±20	101	1,920	445	7.0	30.0	204	
JMSH1010AC	100		65	2.7	9.4	11.8	±20	68	1,372	291	6.2	21.0	197	
JMSL1008AH	TO251-3L	100	82	1.7	6.7	8.1	±20	101	2,200	445	8.0	34.0	228	
JMSL1006AK	TO252-3L	100	99	1.7	5.4	6.6	±20	125	2,604	567	9.6	42.0	227	
JMSL1008AK		100	82	1.7	6.7	8.1	±20	101	2,200	445	8.0	34.0	228	
JMSH1004AE	TO263-3L	100	190	2.7	3.0	3.6	±20	245	4,398	1,361	8.5	66.0	198	
JMSH1004BE		100	139	2.7	3.5	4.2	±20	304	3,433	905	13.0	57.2	200	
JMSH1006AE		100	114	2.7	5.2	6.4	±20	130	2,369	545	11.6	38.0	198	
JMSH1008AE		100	95	2.8	6.8	8.0	±20	101	1,920	445	7.0	30.0	204	
JMSH1010AE		100	65	2.7	9.4	11.8	±20	68	1,372	291	6.2	21.0	197	

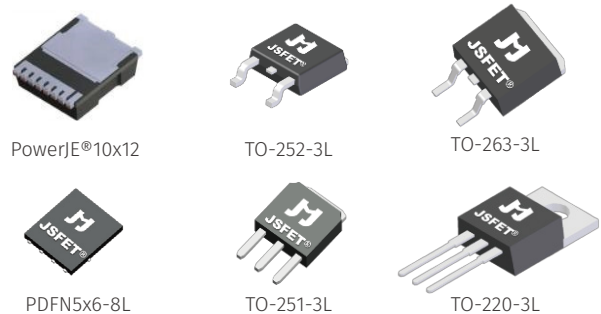
## Benchmark Information



## Shipping Information

Package	# of Pins	Media	Quantity (pcs)
PDFN5x6-8L	8	13-inch Reel	3,000
TO-220-3L	3	Tube	50
TO-251-3L	3	Tube	80
TO-252-3L	3	13-inch Reel	2,500
TO-263-3L	3	13-inch Reel	800
PowerJE®10x12	8	13-inch Reel	2,000

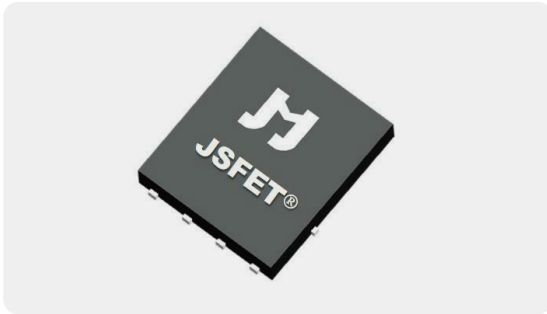
Samples and production quantities of the 100V-series J5FET are available from [sales\\_sh@jjwdz.com](mailto:sales_sh@jjwdz.com) and authorized sales distributors.





## 捷捷微电推出 150V JSFET® 助力 5G通信、BLDC、BMS 等应用

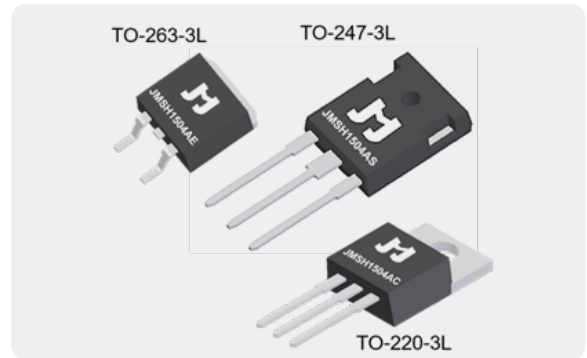
满足超高功率密度和能效需求



2021年9月9日 - 捷捷微电推出新款150V系列N-沟道JSFET®, 采用 TO-220-3L, TO-247-3L 及TO-263-3L封装, 超优的热导性能减少热点, 提升可靠性; 符合5G通信电源及有源以太网 (PoE++) 供应端电源、储能电池组电源管理 (BMS) 优化器、无刷电机驱动 (BLDC) 等应用对超高功率密度和能效的需求。器件内部配以全铜框架, 电流处理能力达185A。在 $V_{GS} = 10V$ 条件下, 系列中TO-263-3L封装的JMSH1504AE, 标准导电阻抗低至3.9mΩ, 与国际半导体IDM大厂的同类产品不相伯仲。

Bench-marking	Company	Package	$V_{DS\_Max}$ (V)	$R_{DS(ON)\_Typ}$ @ $V_{GS}=10V$ (mΩ)	$R_{DS(ON)\_Max}$ @ $V_{GS}=10V$ (mΩ)	$E_{AS\_Max}$ (mJ)	$C_{iss}$ (pF)	$C_{oss}$ (pF)	$C_{rss}$ (pF)	$Q_g$ (nC)	FOM
JMSH1504AE	Jiejie Micro.	TO-263-3L	150	3.90	4.90	889	6,540	772	6.7	88	343
AOx66518x	US - Alxx	TO-263	150	4.20	5.00	735	6,460	820	5.0	80	336
IPx048N15x	EU - Inxx	PG-TO 263-3	150	3.70	4.80	230	6,000	1,500	34.0	80	296
NTx5D0N15xx	US - Onxx	TO-263	150	3.80	5.00	<1,014	6,300	1,900	13.0	75	285
SUX80090x	US - Vixx	TO-263	150	7.50	9.00	>180	3,425	535	26.0	63	473

新的JMSH1504系列功率器件提供插件式及贴片式两种封装, 方便应用电路PCB版图设计及电子元件放置。与同类采用TO-263封装的竞品相比, 不仅在导通阻抗、雪崩能量、米勒及输出电容等参数方面大有优势; 也具备良好的线性模式 / 安全工作区域 (SOA) 特性, 可以在大电流条件下安全可靠地开关工作。捷捷微电功率MOSFET器件市场经理樊君:「因应国家在大力推动5G基建, 越来越多智能终端如高精度定位模块及人像识别传感器等, 透过千兆以太网连接RAN交换机作信号传输的同时; 也从交换机PSE供电设备模组获取最高IEEE 802.3bt PoE++第四级100W的供电。JMSH1504AE超低的导通阻抗 (3.9mΩ) 能保证交换机里的PSE供电设备模组, 在供电给多至二十四组PoE++ PD终端时, 确保最佳的电源转换效能及工作温度。」

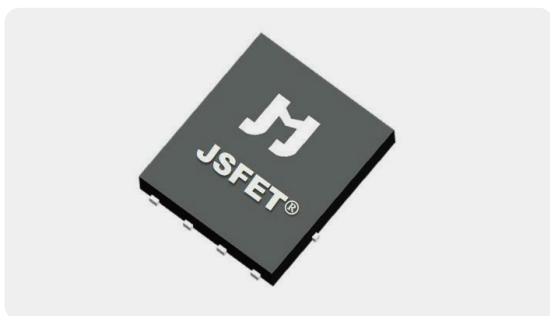


JMSH1504系列SGT MOSFET能满足通信类、BMS、BLDC等应用对器件牢固性和可靠性的需求。在数据中心、5G数据交换机、安防系统伺服器里也常会用在OR-ing及热插拔等应用。极低的米勒电容 (6.7pF) 及输出电容 (772pF), 和高达889mJ的雪崩能量 (EAS), 能轻松的处理高电平转低电平子系统中电源关断时常出现的尖峰电压, 确保长期稳定的系统运转。

- 捷捷微电销售部
- 合约代理商
- 相关商务渠道

目前 JMSH1504系列SGT MOSFET经已量产, 样品可从捷捷微电销售部、合约代理商、或相关商务渠道申请。产品规格书, 辅助系统电路设计的封装资料如 POD (package outline drawing) 及仿真模型如 H-Spice、P-Spice及长期可靠性报告等具体信息, 可联系相关销售人员或直接在官网浏览、下载 <https://www.jjwdz.com/product/104/>

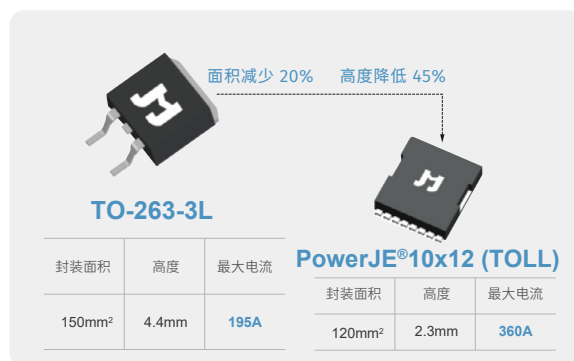
## 捷捷微电 发布先进 PowerJE®10x12 封装及国内领先 SGT MOSFET



2022 年 1 月 26 日 捷捷微电 特此专题介绍自主研发的高功率薄型封装, PowerJE®10x12 已进入规模化量产。此封装符合 JEDEC 标准 MO-299B, 同时兼容国际大厂如 Infineon 及 Onsemi 的同类 TOLeadLess 封装, 并通过严苛的一千次温度循环 (-55 ~ 150°C) 可靠性测试。相比传统的 TO-263-3L 封装, 面积少了 20%、高度降低了 45%。在大幅度减少占用空间的同时, 有效的提高功率密度, 适合极为紧凑的终端设计。热阻表现优越而至散热效果更好, 进一步保证器件的长期可靠性。

Bench-marking	Company	Package	$V_{DS\_Max}$ (V)	$R_{DS(ON)\_Typ}$ @ $V_{GS}=10V$ (mΩ)	$R_{DS(ON)\_Max}$ @ $V_{GS}=10V$ (mΩ)	$E_{AS\_Max}$ (mJ)	$C_{ISS}$ (pF)	$C_{OSS}$ (pF)	$C_{RSS}$ (pF)	$Q_g$ (nC)
JMSH1001ATL	Jiejie Micro.	PowerJE®10x12	100	1.30	1.60	1.250	9,623	2,091	1.2	155
AOxL6691x	US - AOx	TOLLA	100	1.40	1.70	405	12,500	3,190	55.0	155
IPx015N10Nx	EU - Inxx	PG-HSOF-8	100	1.30	1.50	775	12,000	1,800	80.0	169
FDxL0200N1xx	US - Onxx	TO-LL 8L	100	1.50	2.00	352	6,970	3,950	29.0	95

因应客户对性能及 BOM (bill of material) 空间的需求日渐提升, 捷捷微电同时推出 N 沟道含自主知识产权 JSFET® 系列的 JMSH1001ATL ( $V_{DS\_Max} = 100V$ ) 和 JMSH1504ATL ( $V_{DS\_Max} = 150V$ ), 两者均采用先进 PowerJE®10x12 封装。在  $V_{GS}=10V$  条件下, 器件的  $R_{DS(ON)\_Typ}$  及 FOM 测量值分别是  $1.3m\Omega / 202$  (JMSH1001ATL) 及  $3.3m\Omega / 290$  (JMSH1504ATL)。其中 JMSH1001ATL 的电气特性, 更为国内领先水平、与欧美日同类产品不遑多让。此外, 一流的线性模式 / 安全工作区 (SOA) 特性, 使器件在大电流的工作状态下, 仍能实现安全可靠的运作。极低的导通电阻有助于提高运行效能, 降低系统成本, 并延长器件的使用寿命。这两款产品已经广泛应用于电动工具、轻型电动车辆、光伏储能逆变器、5G 通信及 PoE++ 等终端。



捷捷微电 功率分立器件市场总监 樊君:「JMSH1001ATL 结合捷捷微电研发团队设计的芯片、由通过 IATF 16949 认证的晶圆厂制造、再经捷捷微电车规级先进封装产线实现 PowerJE®10x12 组装测试, 电器特性比肩国际一线半导体 IDM 大厂, 有效实现了同类产品的国产化高端突破。该器件不仅具有超优的热导性能、低封装寄生电感效应, 且可处理高达 375A 的电流, 特别适用于那些在 BOM (bill of material) 空间、电气性能和器件长期可靠性皆同样有高需求的应用。」

- 捷捷微电销售部
- 合约代理商
- 相关商务渠道

目前这两款产品已规模量产, 样品可向 捷捷微电 销售部、合约代理商、或相关商务渠道申请。产品规格书, 辅助系统电路设计的资料如 POD (package outline drawing)、仿真模型 H-Spice 及 P-Spice 等具体信息, 均可直接在官网浏览或下载 <https://www.jjwdz.com/product/103/>

# 体系证书 SYSTEM CERTIFICATION



**职业健康安全管理体系认证证书**  
Occupational Health and Safety Management System Certificate

**环境管理体系认证证书**  
Environmental Management System Certificate

**IECQ 符合性证书**  
IECQ Certificate of Conformity

**生产质量管理证书**  
Production Quality Management Certificates



**IATF 16949:2016**

**ISO 9001:2015**

# 可靠性测试标准 LONG-TERM PRODUCT RELIABILITY

## 消费类等级 Consumer Level

Test Item	Description	Test Conditions	Duration	DUT Quantity
PreCon	Pre-conditioning & IR Reflow (SMT-type DUTs only)	Bake-out for 24 hrs.; $T_A = 125^\circ\text{C}$ ; Moisture Soak: {MSL1 @ $[T_A = 85^\circ\text{C}, \text{RH} = 85\%]$ for 168 hrs.}; or {MSL3 @ $[T_A = 30^\circ\text{C}, \text{RH} = 60\%]$ for 192 hrs.}; IR Reflow for 3 cycles: 1 cycle {preheat zone @ $>185^\circ\text{C}$ -> main heat zone @ $260 (+5/-0)^\circ\text{C}$ for at least 30s} for $t = 180\text{s}$ ; JESD22-A113	Executed before the following tests: C-SAM (22 DUTs), TC, PC, H <sup>3</sup> TRB or HAST, IOL	330 Devices
HTRB	High Temperature Reverse Bias	$T_J = 150^\circ\text{C}$ ; Reverse Bias = Specification Limit x 80%; JESD22-A108	500 Hrs	77 Devices
HTGB	High Temperature Gate Bias	$T_J = 150^\circ\text{C}$ ; Gate Bias = Specification Limit x 100%; JESD22-A108	500 Hrs	77 Devices
PC (AC)	Pressure Cooker (Auto-clave)	$T_A = 121 \pm 2^\circ\text{C}$ ; RH = 100%, P = 15psi; Bias = None; JESD22-A102	96 Hrs	77 Devices (pre-conditioned)
TC	Temperature Cycling	$T_A = \{[-55^\circ\text{C} @ 15\text{min.}] \leftrightarrow [150^\circ\text{C} @ 15\text{min.}]\}$ per 1-hr cycle (air-to-air); Bias = None; JESD22-A104	500 Cycles	77 Devices (pre-conditioned)
H <sup>3</sup> TRB	High Humidity High Temperature Reverse Bias	$T_A = 85^\circ\text{C}$ ; RH = 85%; 80% rated $V_{DS\_MAX}$ up to 100V; JESD22-A101	1,000 Hrs	77 Devices (pre-conditioned)
HAST	Highly Accelerated Temperature & Humidity Stress	$T_A = 130^\circ\text{C}$ ; RH = 85%; $V_{DS} = \pm 80\% V_{DS\_MAX}$ up to 42V; P = 33.3 psi JESD22-A110	96 Cycles	77 Devices (pre-conditioned)
IOL	Intermittent Operating Life	$T_A = 25^\circ\text{C}$ Devices powered to ensure $\Delta T_J > 100^\circ\text{C}$ (not to exceed Absolute Maximum Rating) MIL-STD-750 M1037	10,000 Cycles	77 Devices (pre-conditioned)

## 工业类等级 Industrial Level

Test Item	Description	Test Conditions	Duration	DUT Quantity
PreCon	Pre-conditioning & IR Reflow (SMT-type DUTs only)	Bake-out for 24 hrs.: $T_A = 125^\circ\text{C}$ ; Moisture Soak: {MSL1 @ [ $T_A = 85^\circ\text{C}$ , RH = 85%] for 168 hrs.} or {MSL3 @ [ $T_A = 30^\circ\text{C}$ , RH = 60%] for 192 hrs.}; IR Reflow for 3 cycles: 1 cycle {preheat zone @ $>185^\circ\text{C}$ -> main heat zone @ $260 (+5/-0)^\circ\text{C}$ for at least 30s} for $t = 180\text{s}$ ; JESD22-A113	Executed before the following tests: C-SAM (22 DUTs), TC, PC, H <sup>3</sup> TRB or HAST, IOL	330 Devices
HTRB	High Temperature Reverse Bias	$T_J = 150^\circ\text{C}$ Reverse Bias = Specification Limit x 100%; JESD22-A108	1,000 Hrs	77 Devices
HTGB	High Temperature Gate Bias	$T_J = 150^\circ\text{C}$ Gate Bias = Specification Limit x 100%; JESD22-A108	1,000 Hrs	77 Devices
PC (AC)	Pressure Cooker (Auto-clave)	$T_A = 121 \pm 2^\circ\text{C}$ ; RH = 100%, P = 15psi; Bias = None; JESD22-A102	96 Hrs	77 Devices (pre-conditioned)
TC	Temperature Cycling	$T_A = \{[-55^\circ\text{C} @ 15\text{min.}] \leftrightarrow [150^\circ\text{C} @ 15\text{min.}]\}$ per 1-hr cycle (air-to-air); Bias = None; JESD22-A104	1,000 Cycles	77 Devices (pre-conditioned)
H <sup>3</sup> TRB	High Humidity High Temperature Reverse Bias	$T_A = 85^\circ\text{C}$ ; RH = 85%; 80% rated $V_{DS\_MAX}$ up to 100V; JESD22-A101	1,000 Hrs	77 Devices (pre-conditioned)
HAST	Highly Accelerated Temperature & Humidity Stress	$T_A = 130^\circ\text{C}$ ; RH = 85%; $V_{DS} = \pm 80\% V_{DS\_MAX}$ up to 42V; P = 33.3 psi JESD22-A110	96 Hrs	77 Devices (pre-conditioned)
IOL	Intermittent Operating Life	$T_A = 25^\circ\text{C}$ Devices powered to ensure $\Delta T_J > 100^\circ\text{C}$ (not to exceed Absolute Maximum Rating) MIL-STD-750 M1037	15,000 Cycles	77 Devices (pre-conditioned)

## 汽车类等级 Automotive Level

Test Item	Description	Test Conditions	Duration	DUT Quantity
PreCon	Pre-conditioning & IR Reflow (SMT-type DUTs only)	Bake-out for 24 hrs.: $T_A = 125^\circ\text{C}$ ; Moisture Soak: {MSL1 @ [ $T_A = 85^\circ\text{C}$ , RH = 85%] for 168 hrs.} or {MSL3 @ [ $T_A = 30^\circ\text{C}$ , RH = 60%] for 192 hrs.}; IR Reflow for 3 cycles: 1 cycle {preheat zone @ $>185^\circ\text{C}$ -> main heat zone @ $260 (+5/-0)^\circ\text{C}$ for at least 30s} for $t = 180\text{s}$ ; JESD22-A113	Executed prior to the following tests: C-SAM, TC, PC, H <sup>3</sup> TRB or HAST, IOL	3 Lots x 330 Devices
HTRB	High Temperature Reverse Bias	$T_J = 175^\circ\text{C}$ ; Reverse Bias = Specification Limit x 100%; JESD22-A108	1,000 Hrs	3 Lots x 77 Devices
HTGB	High Temperature Gate Bias	$T_J = 175^\circ\text{C}$ ; Reverse Bias = Specification Limit x 100%; JESD22-A108	1,000 Hrs	3 Lots x 77 Devices
PC (AC)	Pressure Cooker (Auto-clave)	$T_A = 121 \pm 2^\circ\text{C}$ ; RH = 100%, P = 15psi; Bias = None; JESD22-A102	96 Hrs	3 Lots x 77 Devices (pre-conditioned)
TC	Temperature Cycling	$T_A = \{[-55^\circ\text{C} @ 15\text{min.}] \leftrightarrow [150^\circ\text{C} @ 15\text{min.}]\}$ per 1-hr cycle (air-to-air); Bias = None; JESD22-A104	1,000 Cycles	3 Lots x 77 Devices (pre-conditioned)
H <sup>3</sup> TRB	High Humidity High Temperature Reverse Bias	$T_A = 85^\circ\text{C}$ ; RH = 85%; 80% rated $V_{DS\_MAX}$ up to 100V; JESD22-A101	1,000 Hrs	3 Lots x 77 Devices (pre-conditioned)
HAST	Highly Accelerated Temperature & Humidity Stress	$T_A = 130^\circ\text{C}$ ; RH = 85%; $V_{DS} = \pm 80\% V_{DS\_MAX}$ up to 42V; P = 33.3 psi; JESD22-A110	96 Hrs	3 Lots x 77 Devices (pre-conditioned)
IOL	Intermittent Operating Life	$T_A = 25^\circ\text{C}$ Devices powered to ensure $\Delta T_J > 100^\circ\text{C}$ (not to exceed Absolute Maximum Rating) MIL-STD-750 M1037	15,000 Cycles	3 Lots x 77 Devices (pre-conditioned)

## ▶ 插件产品包装量与对应尺寸 TH PACKING INFORMATION

Package		Quantity (pcs)	CBM (cm <sup>3</sup> )
SOT-89-3L	Small box	10,000	21 x 21 x 21
	Carton box	40,000	45 x 44.5 x 23.2
TO-251-3L	Empty Tube	-	-
	Tube	80	53.6 x 2.0 x 0.54
	Small box	4,950	55.5 x 16 x 4.8
	Carton box	29,700	55.5 x 33.5 x 21.5
TO-251L-3L	Empty Tube	-	-
	Tube	80	53.6 x 2.0 x 0.54
	Small box	4,950	55.5 x 16 x 4.8
	Carton box	29,700	55.5 x 33.5 x 21.5
TO-220-3L	Empty Tube	-	-
	Tube	50	53 x 3.3 x 0.7
	Small box	1,000	55 x 14 x 4.5
	Carton box	5,000	57 x 26 x 16
TO-220AS-3L	Empty Tube	-	-
	Tube	50	53 x 3.3 x 0.7
	Small box	1,000	55 x 14 x 4.5
	Carton box	5,000	57 x 26 x 16
TO-220C-3L	Empty Tube	-	-
	Tube	50	53 x 3.3 x 0.7
	Small box	1,000	55 x 14 x 4.5
	Carton box	5,000	57 x 26 x 16
TO-220FA-3L	Empty Tube	-	-
	Tube	50	53 x 3.3 x 0.7
	Small box	1,000	55 x 14 x 4.5
	Carton box	5,000	57 x 26 x 16
TO-220FP-3L	Empty Tube	-	-
	Tube	50	53 x 3.3 x 0.7
	Small box	1,000	55 x 14 x 4.5
	Carton box	5,000	57 x 26 x 16
TO-220FP-NL	Empty Tube	-	-
	Tube	50	53 x 3.3 x 0.7
	Small box	1,000	55 x 14 x 4.5
	Carton box	5,000	57 x 26 x 16
TO-262-3L	Empty Tube	-	-
	Tube	50	53 x 3.3 x 0.7
	Small box	1,000	55 x 14 x 4.5
	Carton box	5,000	57 x 26 x 16
TO-247-3L	Empty Tube	-	-
	Tube	30	53 x 4.1 x 0.75
	Small box	450	52 x 13 x 5
	Carton box	2,250	55 x 28 x 18

# 贴片产品包装量与对应尺寸 SMD PACKING INFORMATION

Package		Quantity (pcs)	CBM (cm <sup>3</sup> )
DFN1006-3L	Small box	100,000	21 x 21 x 21
	Carton box	400,000	45 x 45 x 24
DFN2020-6L	Small box	30,000	18.5 x 18.5 x 14
	Carton box	180,000	46 x 40 x 21
DFN3333-8L	Small box	10,000	36.6 x 34.1 x 5.4
	Carton box	50,000	37.5 x 30 x 35.5
TO-220FP-NL	Empty Tube	-	-
	Tube	50	53 x 3.3 x 0.7
	Small box	1,000	56.5 x 16.5 x 5.1
	Carton box	5,000	58 x 28.5 x 18.5
DFN8080-4L	Empty Tube	-	-
	Reel	3,000	-13 inch
	Small box	6,000	36.6 x 34.1 x 5.4
W-DFN3030-8L	Carton box	300,000	37.5 x 30 x 35.5
	Small box	10,000	36.6 x 34.1 x 5.4
	Carton box	50,000	37.5 x 30 x 35.5
DFN5060-8L	Small box	3,000	36.6 x 34.1 x 5.4
	Carton box	15,000	37.5 x 30 x 35.5
PDFN3x3-8L	Small box	10,000	36.6 x 34.1 x 5.4
	Carton box	50,000	37.5 x 30 x 35.5
PDFN3x3-8L-D	Small box	10,000	36.6 x 34.1 x 5.4
	Carton box	50,000	37.5 x 30 x 35.5
PDFN5x6-8L	Small box	3,000	36.6 x 34.1 x 5.4
	Carton box	15,000	37.5 x 30 x 35.5
PDFN5x6-8L-D	Small box	3,000	36.6 x 34.1 x 5.4
	Carton box	15,000	37.5 x 30 x 35.5
PowerJE®7x8	Small box	3,000	36.6 x 34.1 x 5.4
	Carton box	15,000	37.5 x 30 x 35.5
PowerJE®8x8	Small box	3,000	36.6 x 34.1 x 5.4
	Carton box	15,000	37.5 x 30 x 35.5
PowerJE®10x12	Small box	2,000	36.6 x 34.1 x 5.4
	Carton box	10,000	37.5 x 30 x 35.5
SOT-23	Small box	30,000	21 x 21 x 21
	Carton box	120,000	44 x 44 x 23
SOT-23-3L	Small box	30,000	21 x 21 x 21
	Carton box	120,000	44 x 44 x 23
SOT-23-6L	Small box	30,000	21 x 21 x 21
	Carton box	120,000	44 x 44 x 23
SOT-223-3L	Small box	8,000	35 x 34 x 5
	Carton box	40,000	36.5 x 36 x 25.5
SOT-323-3L	Small box	45,000	21 x 21 x 21
	Carton box	180,000	44 x 44 x 23
SOT-363-3L	Small box	45,000	21 x 21 x 21
	Carton box	180,000	44 x 44 x 23
SOT-523-3L	Small box	30,000	21 x 21 x 21
	Carton box	180,000	44 x 44 x 23
SOT-563-6L	Small box	30,000	21 x 21 x 21
	Carton box	180,000	44 x 44 x 23
SOT-723-3L	Small box	45,000	21 x 21 x 21
	Carton box	180,000	44 x 44 x 23
TO-252-3L	Small box	2,500	35 x 34 x 5
	Carton box	25,000	36.5 x 36 x 25.5
TO-263-3L	Empty Tube	-	-
	Tube	50	53 x 3.3 x 0.7
TO-263-7L	Small box	800	35 x 34 x 5
	Carton box	4,000	36.5 x 36 x 25.5
	Empty Tube	-	-
SOP-8L	Tube	50	53 x 3.3 x 0.7
	Small box	800	35 x 34 x 5
	Carton box	4,000	36.5 x 36 x 25.5
TSSOP-8	Small box	8,000	34 x 33 x 5.1
	Carton box	48,000	37 x 37 x 36
	Small box	10,000	34 x 33 x 5.1
	Carton box	60,000	37 x 37 x 36

# ▶ 长期可靠性检测

LONG-TERM RELIABILITY

实验室 LABORATORY



HAST/H<sup>2</sup>TRB



XRF Coating Thickness Gauge



TC



HTRB



IOL



High Temperature Solder Re-flow Furnace



PC/Auto-clave

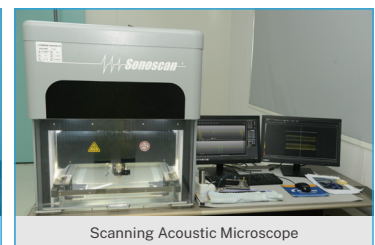
# ▶ 产品失效分析

FAILURE ANALYSIS

实验室 LABORATORY



Laser Opener/Cutter



Scanning Acoustic Microscope



Chamber of Wet Chemical Decapsulation



Scanning Electronic Microscope



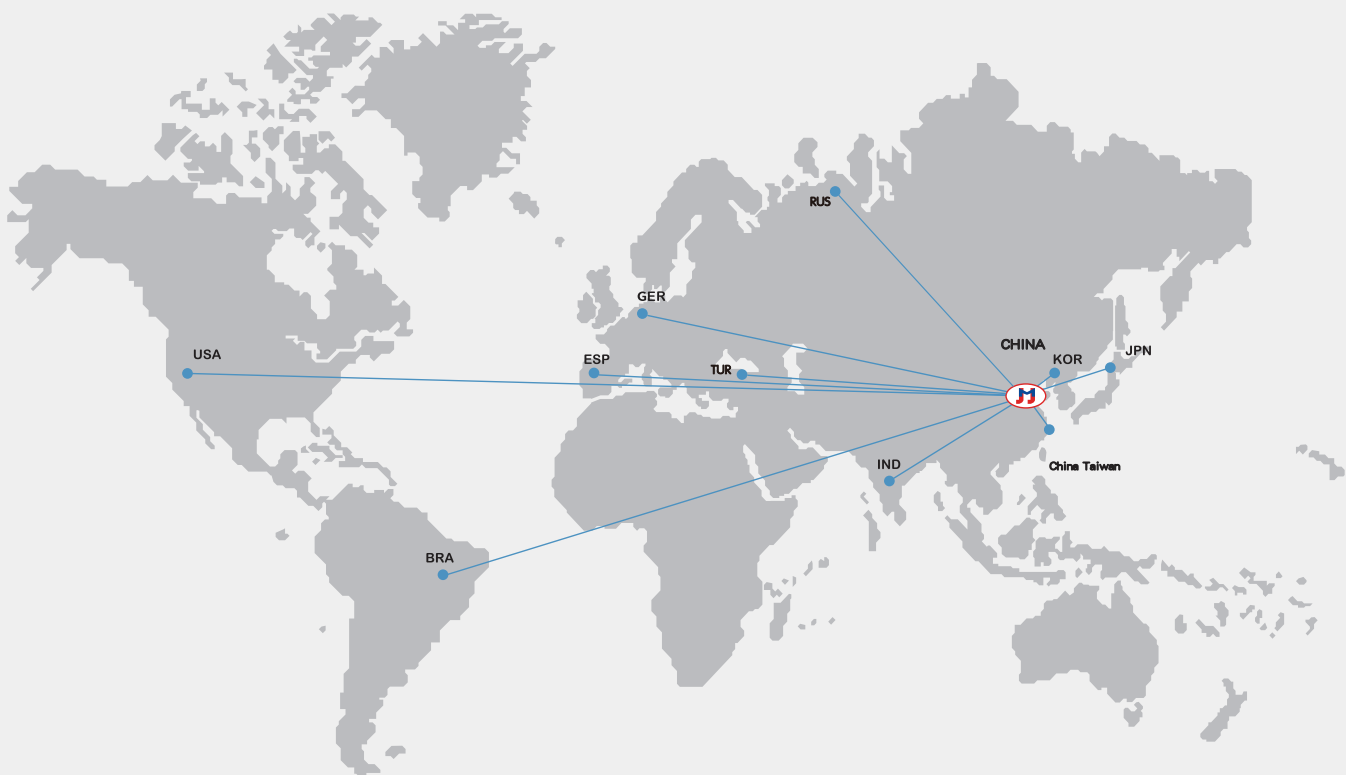
Precision Lapping & Polishing Machine



High Resolution X-ray Inspection System



3-Axis Measuring Microscope



**江苏捷捷微电子股份有限公司**  
**JIANGSU JIEJIE MICROELECTRONICS CO., LTD.**

地址：江苏省启东市经济开发区钱塘江3000号  
**Address:** 3000 Qiantangjiang Road, Economic Development Zone,  
Qidong, Jiangsu, China  
邮箱：sales@jjwdz.com

**捷捷微电(无锡)科技有限公司**  
**JIEJIE MICROELECTRONICS (WUXI) TECHNOLOGY CO., LTD.**

地址：江苏省无锡市新吴区菱湖大道200号B栋221室  
**Address:** Room 221, 200 Linghu Road, Xinwu District, Wuxi, Jiangsu, China  
邮箱：sales\_wx@jjwdz.com

**捷捷微电(上海)科技有限公司**  
**JIEJIE MICROELECTRONICS (SHANGHAI) TECHNOLOGY CO., LTD.**

地址：中国(上海)自由贸易试验区临港新片区海洋一路333号A座11层  
**Address:** 11/F, Block A, 333 Haiyang 1st Road, Lingang Special Area,  
Shanghai Pilot Free Trade Zone, China  
地址：上海市闵行区黎安路999号AFC中建信大虹桥国际15层02室  
**Address:** Suite 1502, 15/F, AFC Tower, 999 Li'An Road,  
Minhang District, Shanghai, China  
邮箱：sales\_sh@jjwdz.com



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