JJMICROELECTRONICS

-20V, -1.2A, 271mΩ P-channel Power Trench MOSFET

JMTD3139K

Features

- Excellent $R_{DS(ON)}$ and Low Gate Charge
- Halogen-free; RoHS-compliant
- Pb-free plating

Applications

- Load Switch
- PWM Application
- Power Management

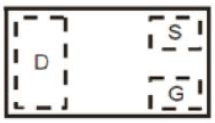
Product Summary

Parameters	Value	Unit
V_{DSS}	-20	V
$V_{GS(th)_Typ}$	-0.7	V
I_D(@V_{GS}=10V)	-1.2	A
$R_{DS(ON)_Typ}$(@V_{GS}=-4.5V)	271	mΩ
$R_{DS(ON)_Typ}$(@V_{GS}=-2.5V)	360	mΩ

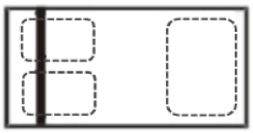
RoHS

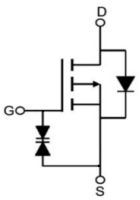
Lead-free Green

DFN1006-3L



Pin Assignment





Schematic Diagram

Ordering Information

Device	Marking	MSL	Form	Package	Reel(pcs)	Per Carton (pcs)
JMTD3139K	39K	1	Tape&Reel	DFN1006-3L	3000	120000

Absolute Maximum Ratings (@ T_A = 25°C unless otherwise specified)

Symbol	Parameter		Value	Unit
V_{DS}	Drain-to-Source Voltage		-20	V
V_{GS}	Gate-to-Source Voltage		±10	V
I_D	Continuous Drain Current	T_A = 25°C	-1.2	A
		T_A = 100°C	-0.8	
I_{DM}	Pulsed Drain Current [1]		Refer to Fig.4	A
P_D	Power Dissipation	T_A = 25°C	0.8	W
		T_A = 100°C	0.3	
T_J, T_{STG}	Junction & Storage Temperature Range		-55 to 150	°C

Thermal Characteristics

Symbol	Parameter	Max	Unit
$R_{\theta JA}$	Thermal Resistance, Junction to Ambient[2]	153	

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Electrical Characteristics (T_J = 25°C unless otherwise specified)

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
Off Characteristics						
$V_{(BR)DSS}$	Drain-Source Breakdown Voltage	I_D = -250μA, V_{GS} = 0V	-20	-	-	V
I_{DSS}	Zero Gate Voltage Drain Current	V_{DS} = -20V, V_{GS} = 0V	-	-	-1.0	μA
I_{GSS}	Gate-Body Leakage Current	V_{DS} = 0V, V_{GS} = ±10V	-	-	±10	μA
On Characteristics						
$V_{GS(th)}$	Gate Threshold Voltage	V_{DS} = V_{GS}, I_D = -250μA	-0.5	-0.7	-0.9	V
$R_{DS(ON)}$	Static Drain-Source ON-Resistance(3)	V_{GS} = -4.5V, I_D = -0.5A	-	271	352	mΩ
		V_{GS} = -2.5V, I_D = -0.4A	-	360	467	mΩ
Dynamic Characteristics						
R_g	Gate Resistance	f = 1MHz	-	114	-	Ω
C_{iss}	Input Capacitance	V_{GS} = 0V, V_{DS} = -10V, f = 1MHz	49	69	103	pF
C_{oss}	Output Capacitance		13	18	26	pF
C_{rss}	Reverse Transfer Capacitance		-	9.1	-	pF
Q_g	Total Gate Charge	V_{GS} = 0 to -4.5V, V_{DS} = -10V, I_D = -1A	-	1.0	-	nC
Q_{gs}	Gate Source Charge		-	0.3	-	nC
Q_{gd}	Gate Drain("Miller") Charge		-	0.1	-	nC
Switching Characteristics						
$t_{d(on)}$	Turn-On DelayTime	V_{GS} = -4.5V, V_{DD} = -10V, I_D= -0.5A, R_{GEN} = 3Ω	-	6.3	-	ns
t_r	Turn-On Rise Time		-	11	-	ns
$t_{d(off)}$	Turn-Off DelayTime		-	41	-	ns
t_f	Turn-Off Fall Time		-	23	-	ns
Body Diode Characteristics						
I_S	Maximum Continuous Body Diode Forward Current		-	-	-1.2	A
I_{SM}	Maximum Pulsed Body Diode Forward Current		-	-	-4.9	A
V_{SD}	Body Diode Forward Voltage	V_{GS} = 0V, I_S = -0.5A	-		-1.2	V
trr	Body Diode Reverse Recovery Time	I_F = -1A, di/dt = 100A/us	-	8.3	-	ns
Qrr	Body Diode Reverse Recovery Charge		-	0.8	-	nC

Notes: 1. Repetitive Rating: Pulse Width Limited by Maximum Junction Temperature.

2. $R_{\theta JA}$ is measured with the device mounted on a $1inch^2$ pad of 2oz copper FR4 PCB.

3. Pulse Test: Pulse Width≤300μs, Duty Cycle≤0.5%.

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Typical Performance Characteristics

Figure 1: Power De-rating

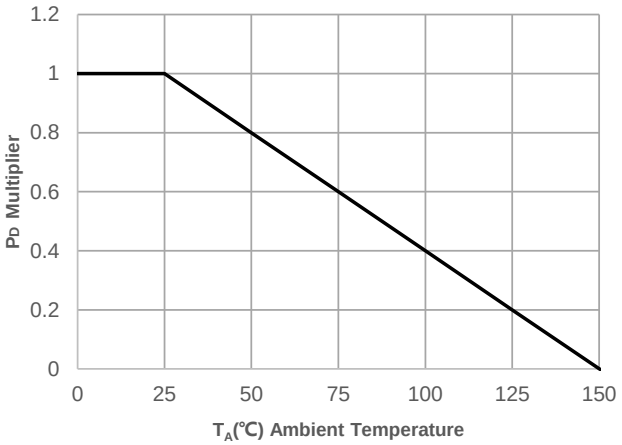


Figure 2: Current De-rating

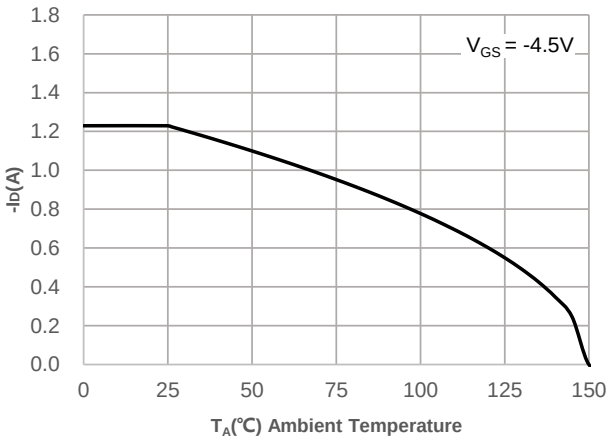


Figure 3: Normalized Maximum Transient Thermal Impedance

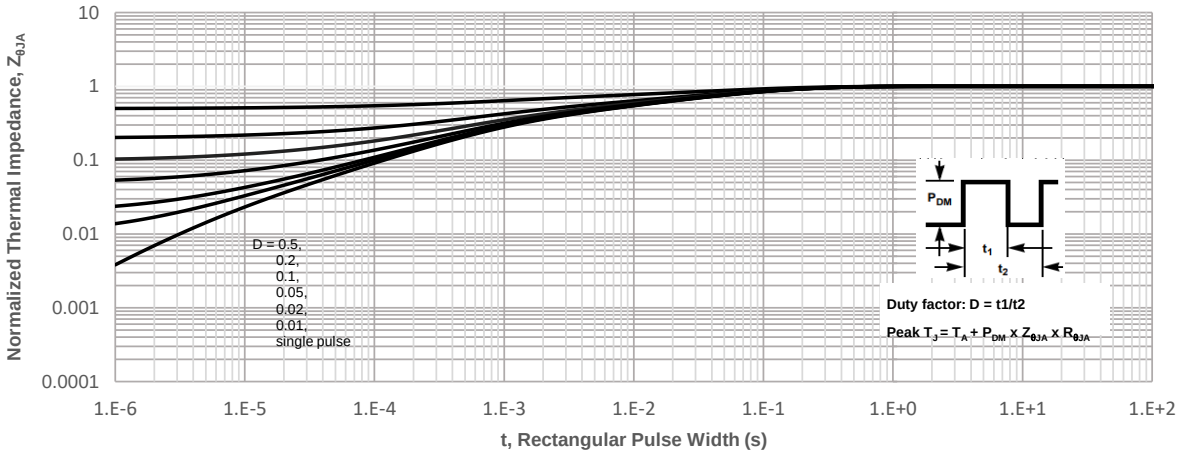
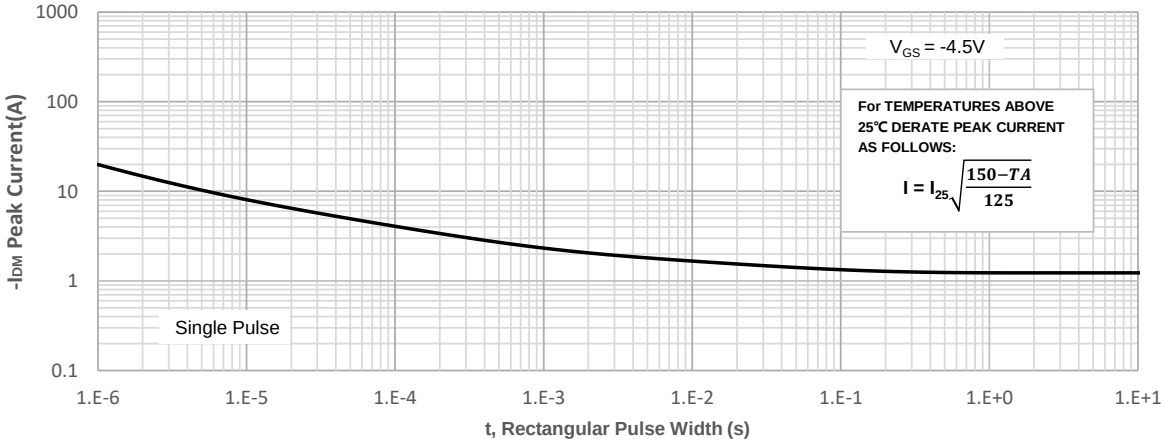


Figure 4: Peak Current Capacity



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Typical Performance Characteristics

Figure 5: Output Characteristics

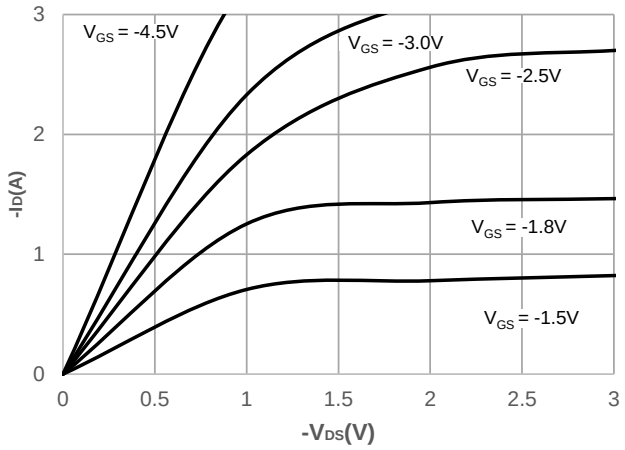


Figure 6: Typical Transfer Characteristics

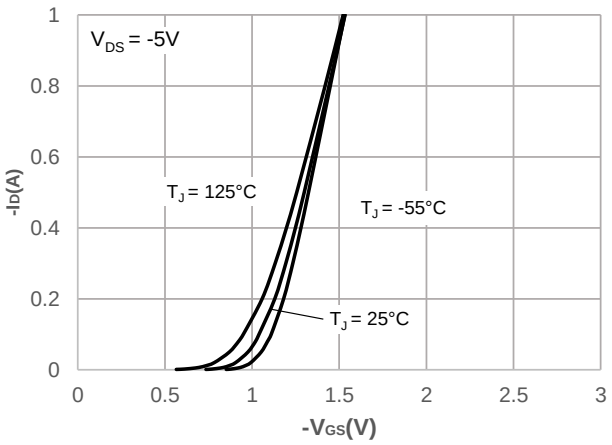


Figure 7: On-resistance vs. Drain Current

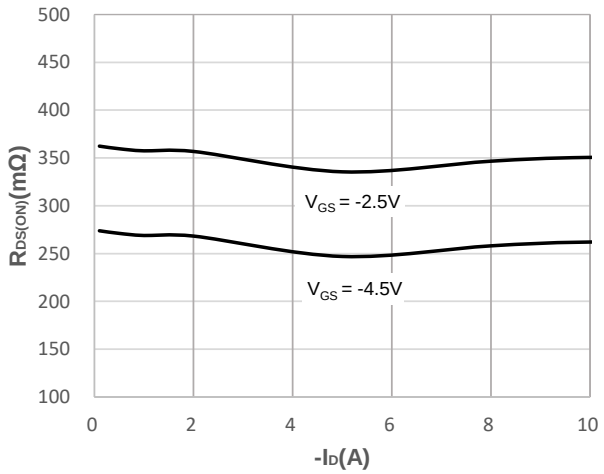


Figure 8: Body Diode Characteristics

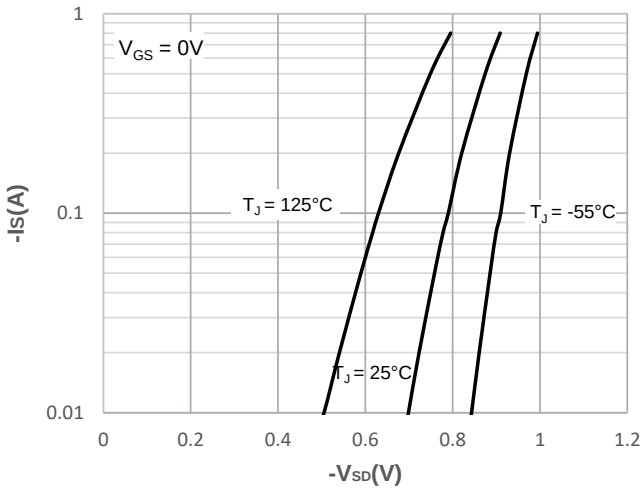


Figure 9: Gate Charge Characteristics

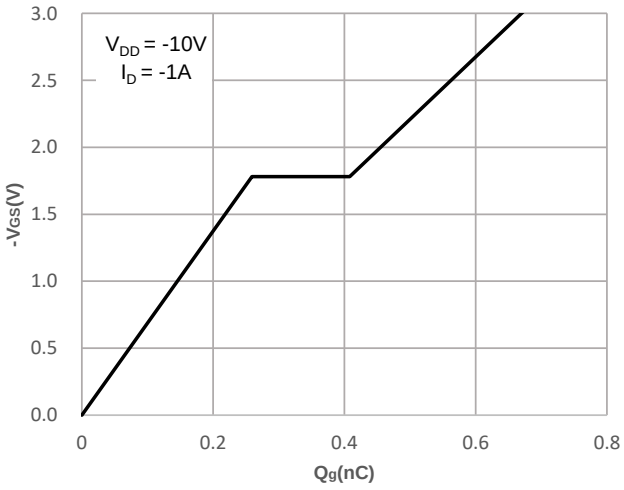
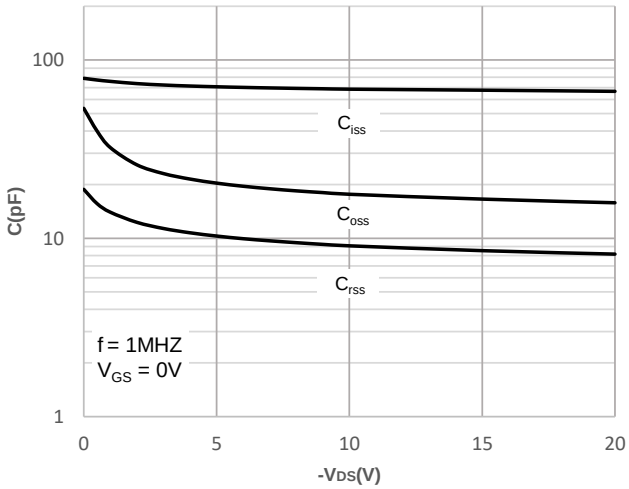


Figure 10: Capacitance Characteristics



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Typical Performance Characteristics

Figure 11: Normalized Breakdown voltage vs. Junction Temperature

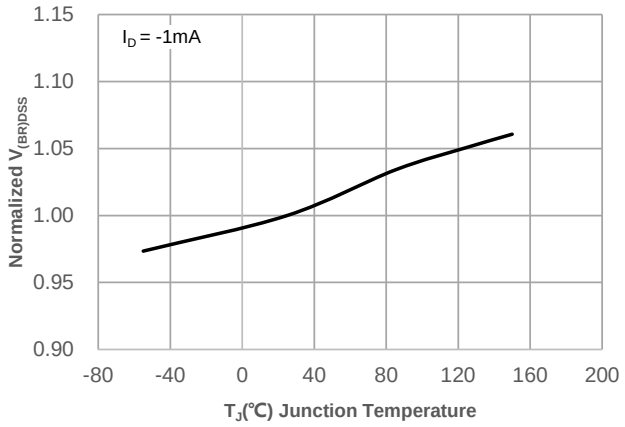


Figure 12: Normalized on Resistance vs. Junction Temperature

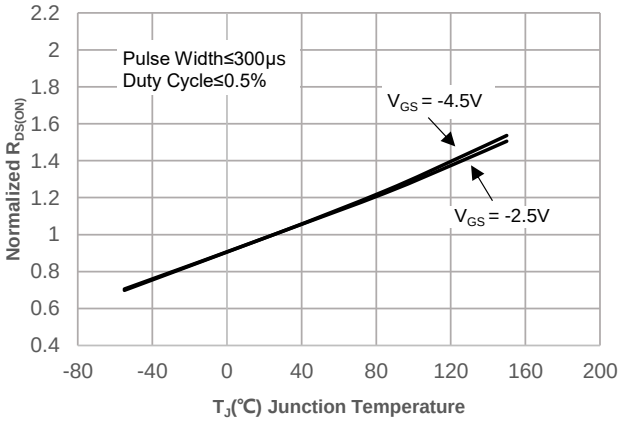


Figure 13: Normalized Threshold Voltage vs. Junction Temperature

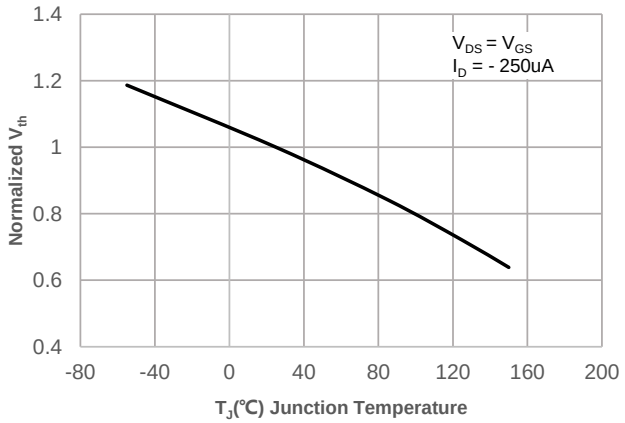


Figure 14: $R_{DS(ON)}$ vs. V_{GS}

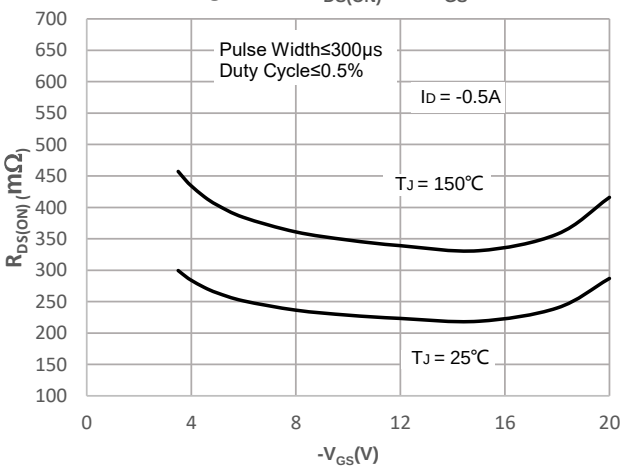
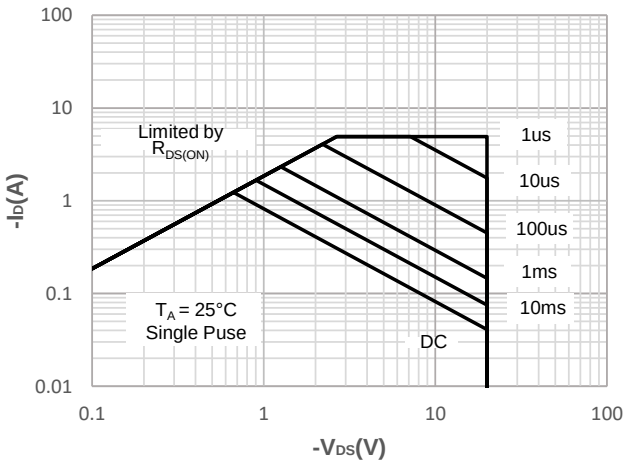


Figure 15: Maximum Safe Operating Area



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Test Circuit

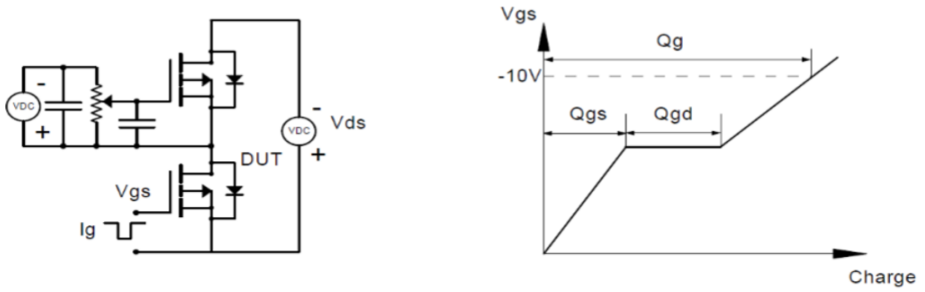

Figure 1: Gate Charge Test Circuit & Waveform

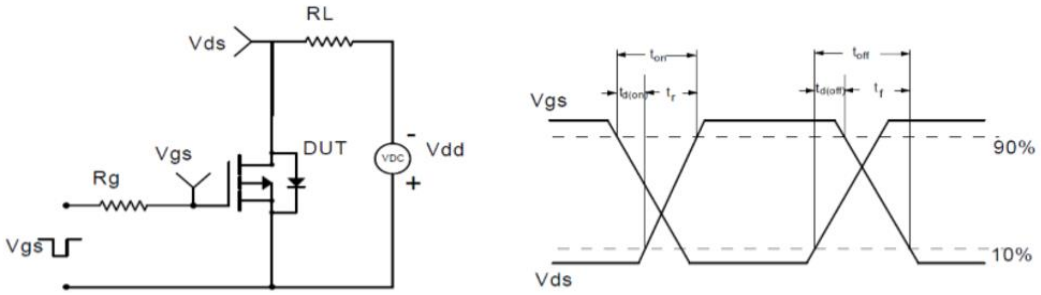

Figure 2: Resistive Switching Test Circuit & Waveform

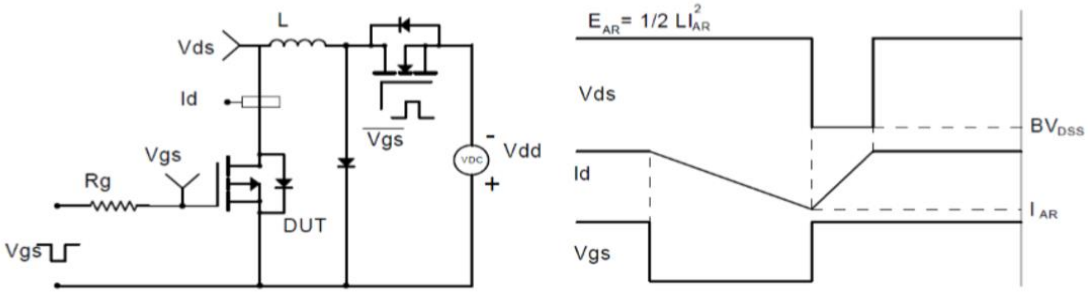

Figure 3: Unclamped Inductive Switching Test Circuit& Waveform

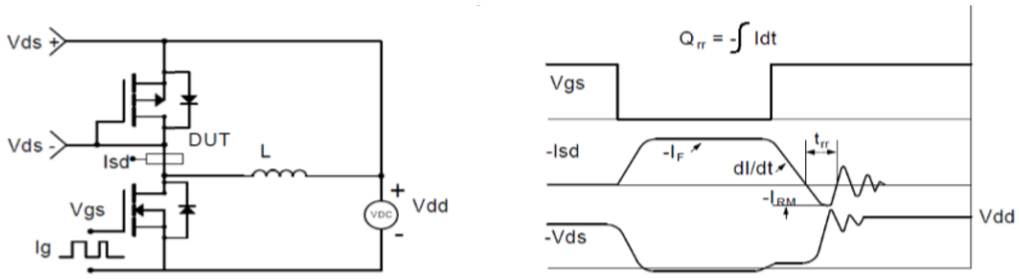

Figure 4: Diode Recovery Test Circuit & Waveform

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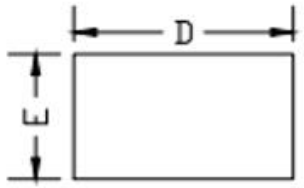
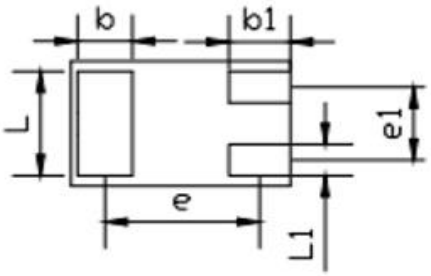
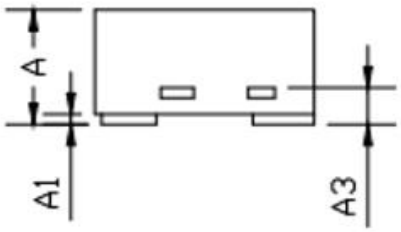
Package Mechanical Data(DFN1006-3L)



TOP VIEW



BOTTOM VIEW



SIDE VIEW

COMMON DIMENSION (MM)			
PKG	DFN1006		
REF.	MIN.	NOM.	MAX
A	>0.4	-	0.50
A1	0.00	-	0.05
A3	0.127REF.		
D	0.95	1.00	1.05
E	0.55	0.60	0.65
b	0.20	0.25	0.30
b1	0.20	0.30	0.40
L	0.45	0.50	0.55
L1	0.10	0.15	0.20
e	0.675		
e1	0.35		

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