

60V, 114A, 5.3mΩ Dual N-channel Power SGT MOSFET
JMSL0606PGDQ
Features

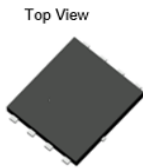
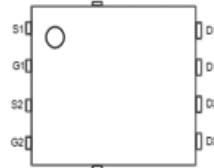
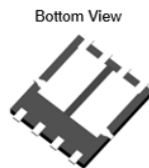
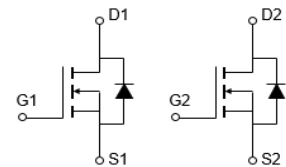
- Ultra-low ON-resistance, $R_{DS(ON)}$
- Low Gate Charge
- 100% UIS Tested
- 100% ΔV_{ds} Tested
- Halogen-free; RoHS-compliant
- AEC-Q101 Qualified

Applications

- Load Switch
- PWM Application
- General Automotive Application

Product Summary

Parameters	Value	Unit
V_{DSS}	60	V
$V_{GS(th_Typ)}$	1.5	V
$I_D(@V_{GS}=10V)$	114	A
$R_{DS(ON_Typ)}(@V_{GS}=10V)$	4.1	mΩ
$R_{DS(ON_Typ)}(@V_{GS}=4.5V)$	5.3	mΩ


PDFN5X6-8L-D

Pin Assignment

Schematic Diagram
Ordering Information

Device	Marking	MSL	Form	Package	Reel(pcs)	Per Carton (pcs)
JMSL0606PGDQ-13	L0606PDQ	1	Tape&Reel	PDFN5x6-8L-D	5000	50000

Absolute Maximum Ratings (@ $T_C = 25^\circ\text{C}$ unless otherwise specified)

Symbol	Parameter	Value	Unit
V_{DS}	Drain-to-Source Voltage	60	V
V_{GS}	Gate-to-Source Voltage	± 20	V
I_D	Continuous Drain Current	$T_C = 25^\circ\text{C}$	114
		$T_C = 100^\circ\text{C}$	80
I_{DM}	Pulsed Drain Current ⁽¹⁾	Refer to Fig.4	A
E_{AS}	Single Pulsed Avalanche Energy ⁽²⁾	188	mJ
P_D	Power Dissipation	$T_C = 25^\circ\text{C}$	130
		$T_C = 100^\circ\text{C}$	65
T_J, T_{STG}	Junction & Storage Temperature Range	-55 to 175	$^\circ\text{C}$

Thermal Characteristics

Symbol	Parameter	Max	Unit
$R_{\theta JA}$	Thermal Resistance, Junction to Ambient ⁽³⁾	56	$^\circ\text{C}/\text{W}$
$R_{\theta JC}$	Thermal Resistance, Junction to Case	1.2	

**Electrical Characteristics** ($T_J = 25^\circ\text{C}$ unless otherwise specified)

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
Off Characteristics						
$V_{(BR)DSS}$	Drain-Source Breakdown Voltage	$I_D = 250\mu\text{A}$, $V_{GS} = 0\text{V}$	60	-	-	V
I_{DSS}	Zero Gate Voltage Drain Current	$V_{DS} = 48\text{V}$, $V_{GS} = 0\text{V}$	-	-	1.0	μA
I_{GSS}	Gate-Body Leakage Current	$V_{DS} = 0\text{V}$, $V_{GS} = \pm 20\text{V}$	-	-	± 100	nA
On Characteristics						
$V_{GS(th)}$	Gate Threshold Voltage	$V_{DS} = V_{GS}$, $I_D = 250\mu\text{A}$	1.2	1.5	1.9	V
$R_{DS(ON)}$	Static Drain-Source ON-Resistance ⁽⁴⁾	$V_{GS} = 10\text{V}$, $I_D = 20\text{A}$	-	4.1	5.3	m Ω
		$V_{GS} = 4.5\text{V}$, $I_D = 15\text{A}$		5.3	6.9	m Ω
Dynamic Characteristics						
R_g	Gate Resistance	$f = 1\text{MHz}$	-	2.6	-	Ω
C_{iss}	Input Capacitance	$V_{GS} = 0\text{V}$, $V_{DS} = 30\text{V}$, $f = 1\text{MHz}$	1345	2241	3362	pF
C_{oss}	Output Capacitance		611	1019	1529	pF
C_{riss}	Reverse Transfer Capacitance		28	47	95	pF
Q_g	Total Gate Charge	$V_{GS} = 0$ to 10V $V_{DS} = 30\text{V}$, $I_D = 20\text{A}$	23	39	58	nC
Q_{gs}	Gate Source Charge		-	6.6	-	nC
Q_{gd}	Gate Drain("Miller") Charge		-	8.0	-	nC
Switching Characteristics						
$t_{d(on)}$	Turn-On DelayTime	$V_{GS} = 10\text{V}$, $V_{DD} = 30\text{V}$ $I_D = 20\text{A}$, $R_{GEN} = 3\Omega$	-	8.9	-	ns
t_r	Turn-On Rise Time		-	31	-	ns
$t_{d(off)}$	Turn-Off DelayTime		-	39	-	ns
t_f	Turn-Off Fall Time		-	17	-	ns
Body Diode Characteristics						
I_S	Maximum Continuous Body Diode Forward Current		-	-	114	A
I_{SM}	Maximum Pulsed Body Diode Forward Current		-	-	455	A
V_{SD}	Body Diode Forward Voltage	$V_{GS} = 0\text{V}$, $I_S = 20\text{A}$	-		1.2	V
t_{rr}	Body Diode Reverse Recovery Time	$I_F = 20\text{A}$, $di/dt = 100\text{A/us}$	24	40	60	ns
Q_{rr}	Body Diode Reverse Recovery Charge		-	35	-	nC

- Notes:
1. Repetitive Rating: Pulse Width Limited by Maximum Junction Temperature.
 2. E_{AS} condition: Starting $T_J = 25^\circ\text{C}$, $V_{DD} = 30\text{V}$, $V_{GS} = 10\text{V}$, $R_G = 25\text{ohm}$, $L = 3\text{mH}$, $I_{AS} = 11.2\text{A}$, $V_{DD} = 0\text{V}$ during time in avalanche.
 3. $R_{\theta JA}$ is measured with the device mounted on a 1inch^2 pad of 2oz copper FR4 PCB.
 4. Pulse Test: Pulse Width $\leq 300\mu\text{s}$, Duty Cycle $\leq 0.5\%$.



Typical Performance Characteristics

Figure 1: Power De-rating



Figure 2: Current De-rating

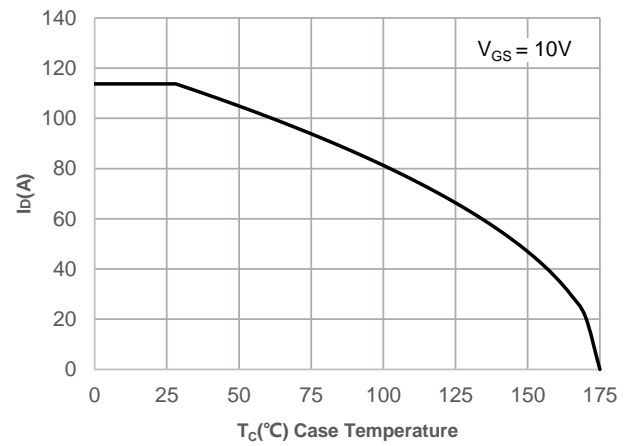


Figure 3: Normalized Maximum Transient Thermal Impedance

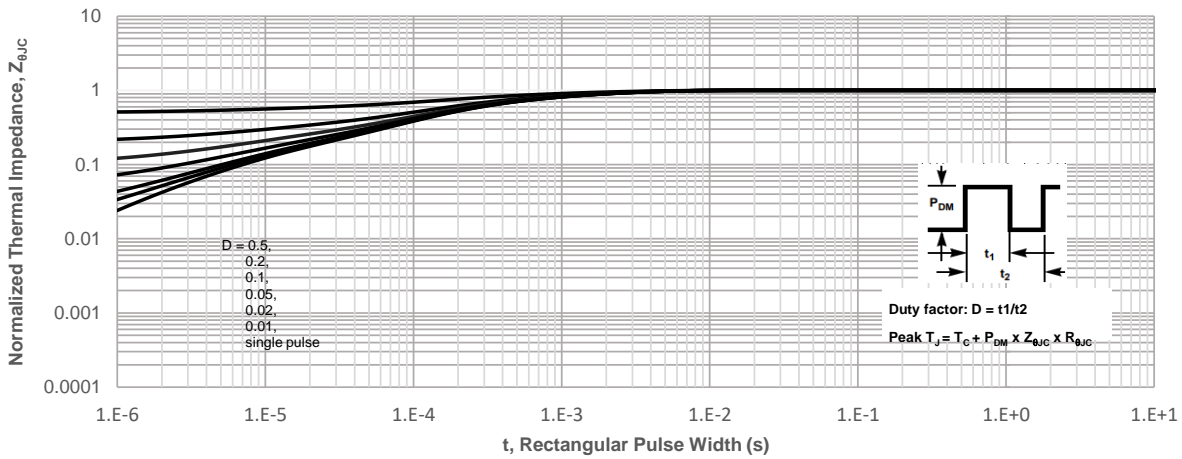
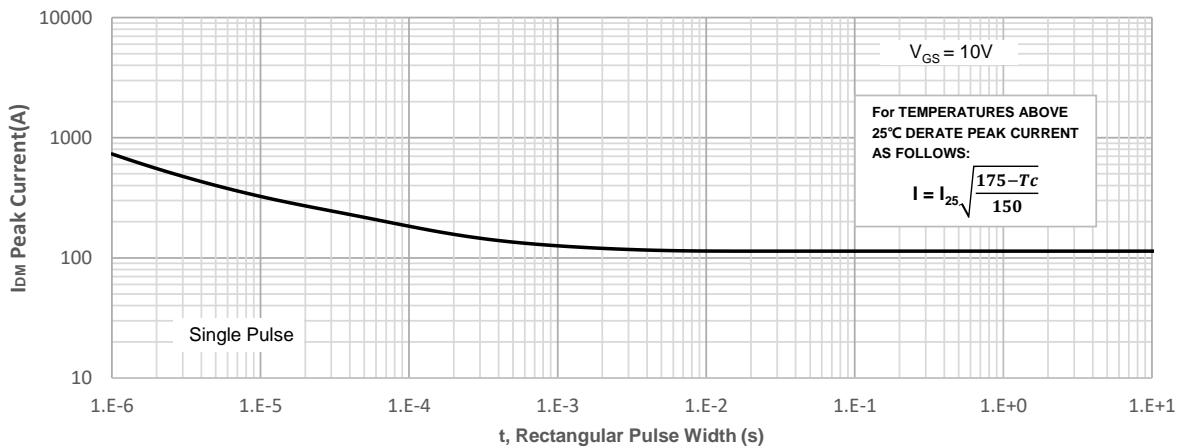


Figure 4: Peak Current Capacity



Typical Performance Characteristics

Figure 5: Output Characteristics

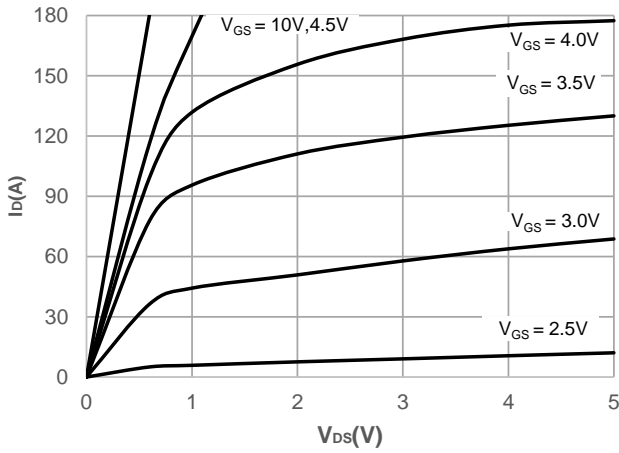


Figure 6: Typical Transfer Characteristics

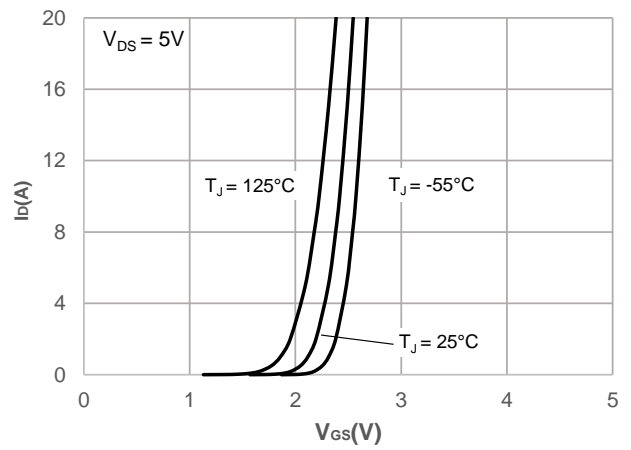


Figure 7: On-resistance vs. Drain Current

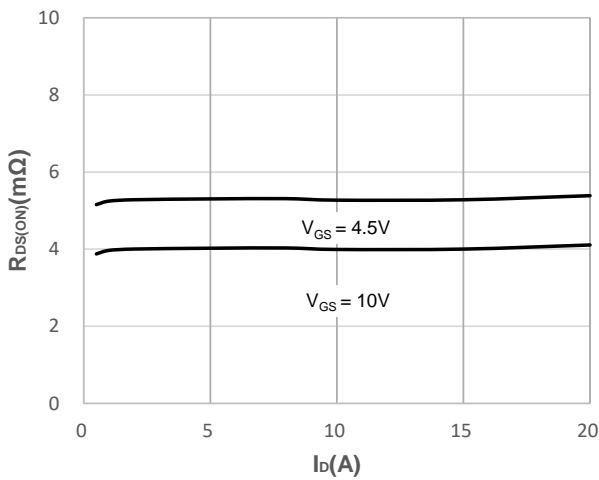


Figure 8: Body Diode Characteristics

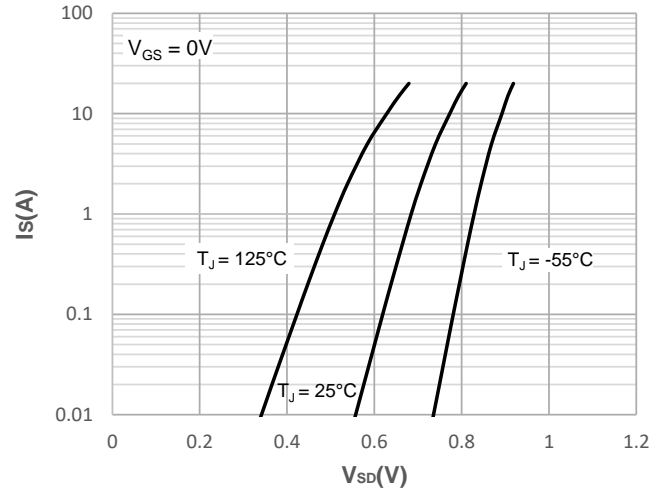


Figure 9: Gate Charge Characteristics

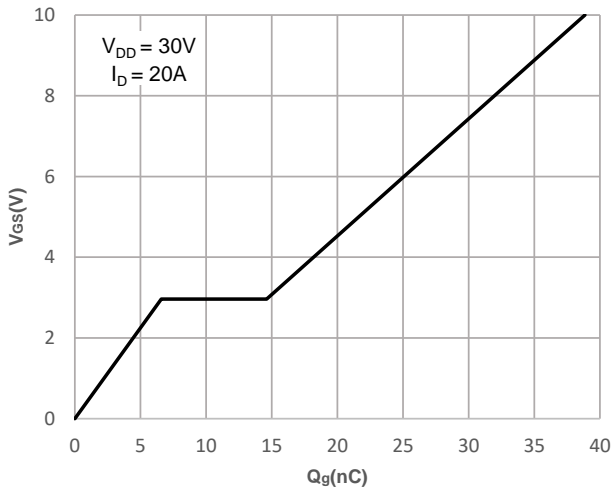
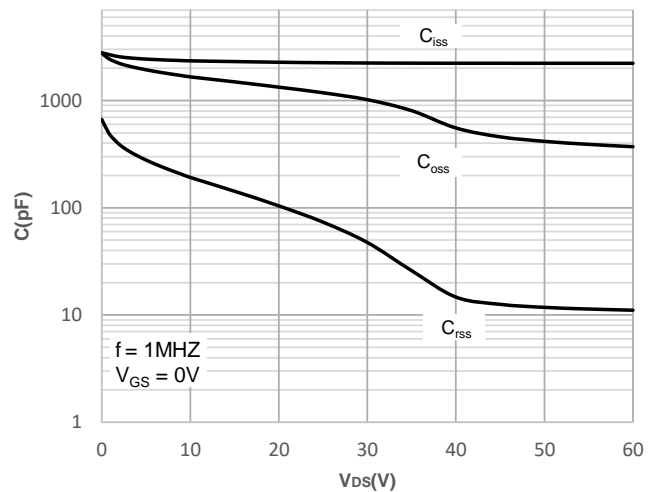


Figure 10: Capacitance Characteristics



Typical Performance Characteristics

Figure 11: Normalized Breakdown voltage vs. Junction Temperature

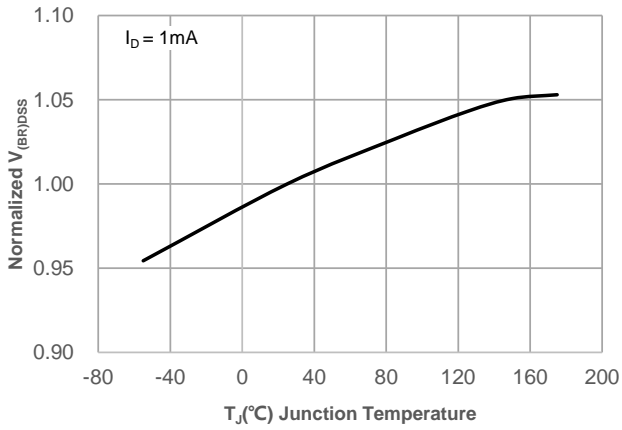


Figure 12: Normalized on Resistance vs. Junction Temperature

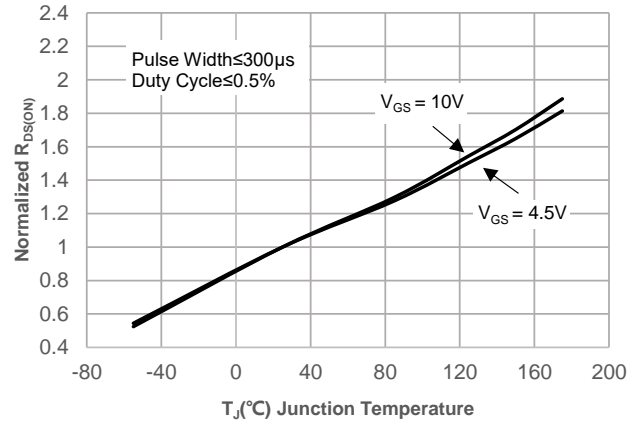


Figure 13: Normalized Threshold Voltage vs. Junction Temperature

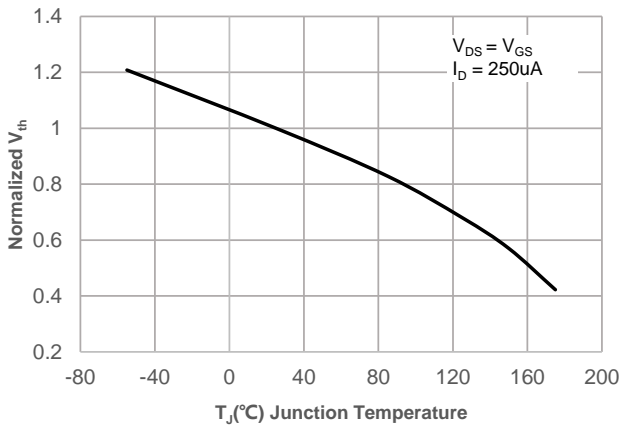


Figure 14: $R_{DS(ON)}$ vs. V_{GS}

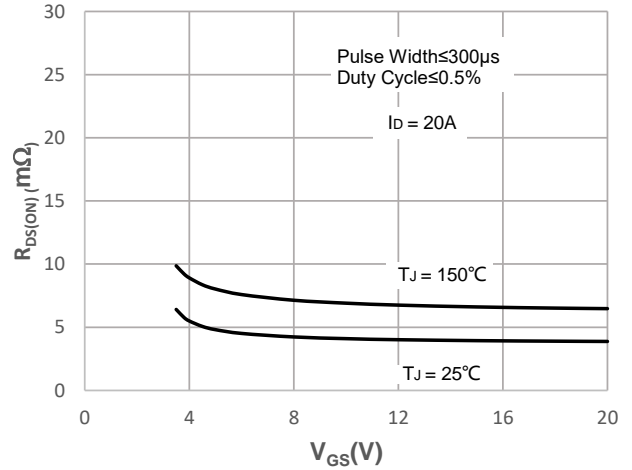
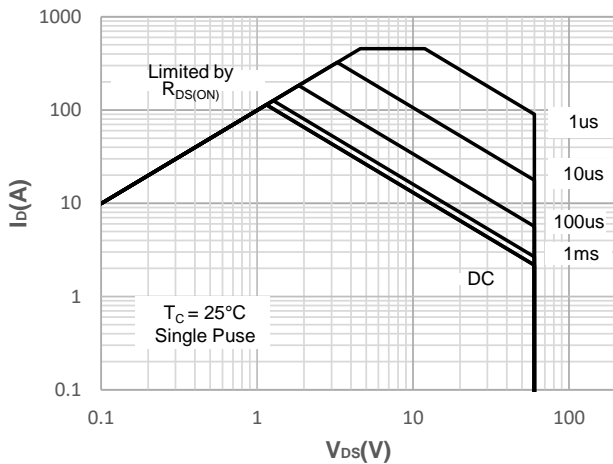


Figure 15: Maximum Safe Operating Area



Test Circuit



Figure 1: Gate Charge Test Circuit & Waveform



Figure 2: Resistive Switching Test Circuit & Waveform



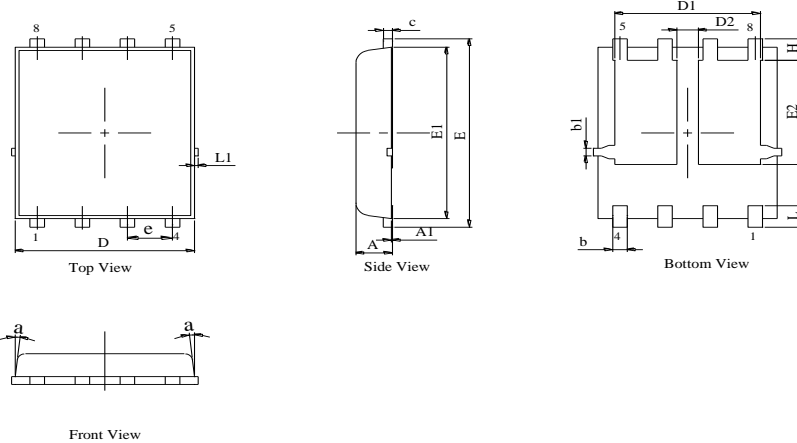
Figure 3: Unclamped Inductive Switching Test Circuit & Waveform



Figure 4: Diode Recovery Test Circuit & Waveform

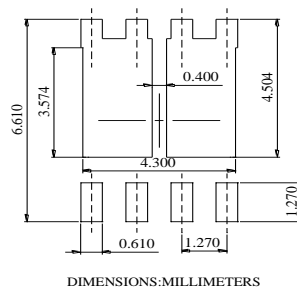


Package Mechanical Data(PDFN5X6-8L-D)

Package Outline

NOTES:

1. DIMENSIONING AND TOLERANCING PER ASME Y14.5M,1994.
2. ALL DIMNESIONS IN MILLIMETER (ANNGL E IN DEGREE).
3. DIMENSIONS D1 AND E1 DO NOT INCLUDE MOLD FLASH PROTRUSIONS OR GATE BURRS.

DIM.	MILLIMETER		
	MIN.	NOM.	MAX.
A	0.90	1.00	1.10
A1	0.00	-	0.10
b	0.31	0.41	0.51
b1	0.15	0.25	0.35
c	0.23	-	0.33
D	4.95	5.05	5.15
D1	4.00	4.10	4.20
D2	0.50	0.60	0.70
E	6.05	6.15	6.25
E1	5.50	5.60	5.70
E2	3.31	3.41	3.51
e	1.27BSC		
H	0.60	0.70	0.80
L	0.50	0.70	0.80
L1	-	-	0.125
a	-	-	12°

Recommended Soldering Footprint


DIMENSIONS:MILLIMETERS

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