SEMICONDUCTOR

SC40N330P4

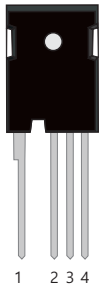
3300V 80A N-Channel SIC Power MOSFET

Features

- High blocking voltage with low on-resistance
- High speed switching with low capacitance
- High operating junction temperature capability
- Easy to Parallel and Simple to Drive

Product Summary			
V_{DS}	$R_{DS(on)}$(mΩ)Typ	I_D(A)	Qg(Typ)
3300V	40 @ 18V 50A	80	348nc

TO-247-4L



Mechanical Data

- Case:TO-247-4L Package

Application

- Motor drivers
- Solar inverters
- Automotive DC/DC converters
- Automotive compressor inverters
- Switch mode power supplies

Block Diagram

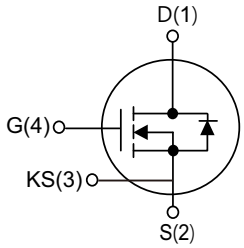


Table1 Absolute Maximum Ratings (T_C=25°C, unless otherwise specified)

Parameter		Symbol	Value	Unit
Drain-Source Voltage		V_{DS}	3300	V
Gate-Source Voltage(Max)		$V_{GS(max)}$	-10/+22	V
Recommend Gate-Source Voltage		V_{GSop}	-5/+18	V
Continuous Drain Current	T_C=25°C	I_D	80	A
	T_C=100°C		56	
Pulsed Drain Current (Note 1)		I_{DM}	225	A
Power Dissipation	T_C=25°C	P_D	428	W
Operating Junction and Storage Temperature		T_J/T_{STG}	-55 ~ +175	°C

Table 2.Thermal Characteristics

Parameter	Symbol	SC40N330P4	Unit
Thermal resistance Junction to Case	$R_{\theta JC}$	0.35	°C/W
Thermal resistance Junction to Ambient	$R_{\theta JA}$	40	°C/W

Table 3. Electrical Characteristics (T_J=25°C, unless otherwise specified)

Parameter		Symbol	Test Conditions	Min	Typ	Max	Unit
Off Characteristics							
Drain-Source Breakdown Voltage		BV_{DSS}	V_{GS}=0V,I_D=250μA	3300	-	-	V
Drain-Source Leakage Current		I_{DSS}	V_{DS}=3300V,V_{GS}=0V	-	-	100	μA
Gate- Source Leakage Current	Forward	I_{GSS}	V_{GS}=22V,V_{DS}=0V	-	-	150	nA
	Reverse		V_{GS}=-10V,V_{DS}=0V	-	-	-150	nA
On Characteristics							
Gate Threshold Voltage		$V_{GS(TH)}$	V_{DS}=V_{GS},I_D=20mA	2.0	3.0	4.5	V
Static Drain-Source On-State Resistance		$R_{DS(ON)}$	V_{GS}=18V,I_D=50A,T_J=25°C	-	40	50	mΩ
			V_{GS}=18V,I_D=50A,T_J=175°C	-	68	-	
Gate Resisitance		R_G	f=1MHz	-	1.5	-	Ω
Dynamic Characteristics							
Input Capacitance		C_{ISS}	V_{DS}=1000V,V_{GS}=0V, f=1MHz,V_{AC}=25mV	-	7385	-	pF
Output Capacitance		C_{OSS}		-	132	-	pF
Reverse Transfer Capacitance		C_{RSS}		-	13.5	-	pF
Coss stored energy		E_{OSS}	V_{DS}=1200V,f=1MHz	-	93	-	μJ
Turn-on switching energy		E_{ON}	V_{DS}=1700V,I_D=50A V_{GS}=-5/18V,R_G=3Ω, T_J=25°C	-	2010	-	μJ
Turn-off switching energy		E_{OFF}		-	780	-	μJ
Turn-On Delay Time		td(on)		-	78	-	ns
Turn-On Rise Time		t_R		-	42	-	ns
Turn-Off Delay Time		td(off)		-	32	-	ns
Turn-Off Fall Time		tf		-	19	-	ns
Total Gate Charge		Q_G	V_{DD}=1000V,I_D=50A, V_{GS}=-5/18V	-	348	-	nC
Gate-Source Charge		Q_{GS}		-	128	-	nC
Gate-Drain Charge		Q_{GD}		-	108	-	nC
Drain-Source Diode Characteristics and Maximum Ratings(Note 2)							
Drain-Source Diode Forward Voltage		V_{SD}	V_{GS}=0V,I_S=25A	-	3.3	-	V
Reverse Recovery Time		trr	V_{GS}=-5V, V_R=1700V,T_J=175°C I_{SD}=50A,diF/dt=500A/μs	-	178	-	ns
Recovered charge		Qrr		-	2838	-	nC
Peak reverse recovery current		Irrm		-	23	-	A

Notes: 1 RepetitiveRating Pulse width limited by maximum junction temperature

2 Pulse Test: Pulse width ≤300μS,Duty cycle≤2%

Typical Characteristics Diagrams

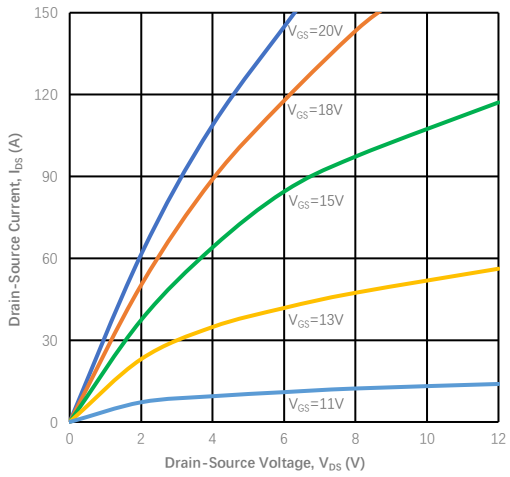


Figure 1

Output Characteristics (T_J=25°C)

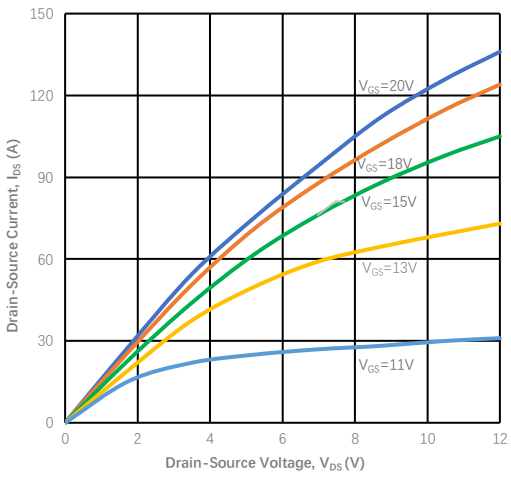


Figure 2

Output Characteristics (T_J=175°C)

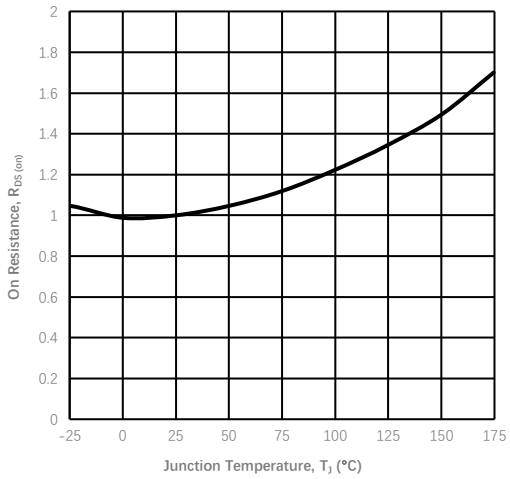


Figure 3

Normalized On-Resistance vs. Temperature

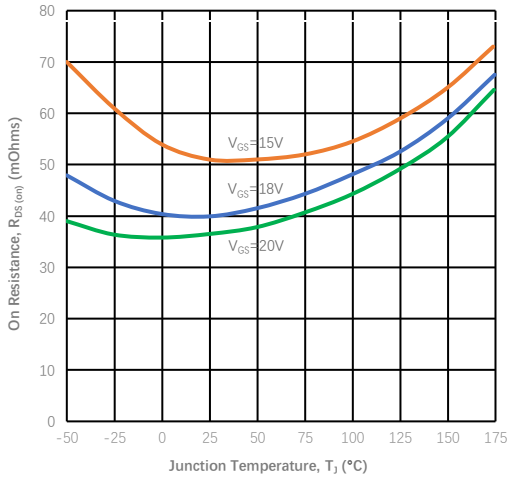


Figure 4

On-Resistance vs. Temperature

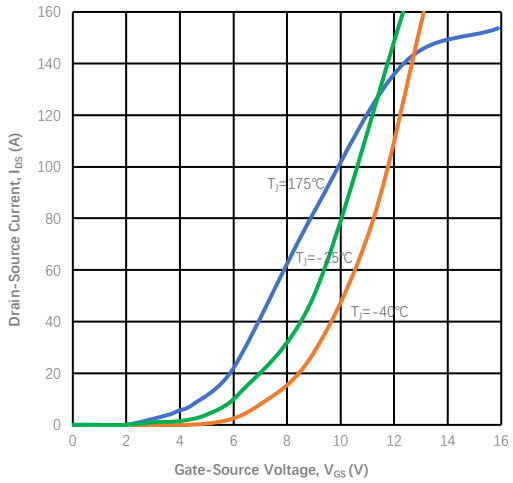


Figure 5

Transfer Characteristic

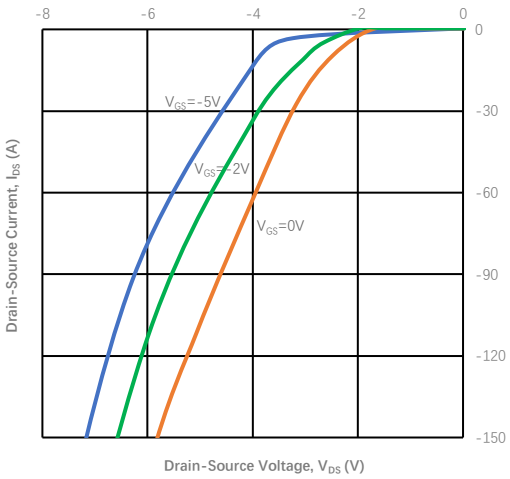


Figure 6

Body Diode Characteristic at 25°C

Typical Characteristics Diagrams

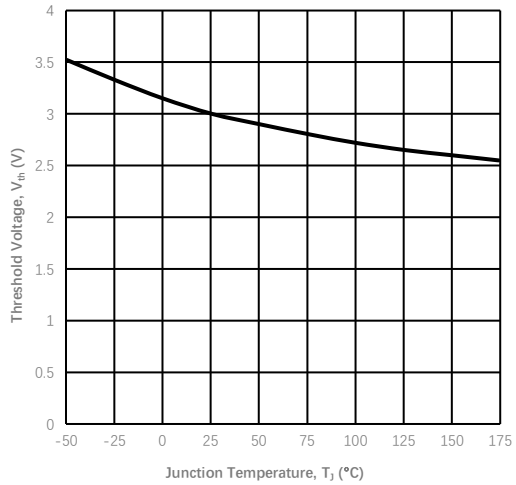


Figure 7

Threshold Voltage vs. Temperature

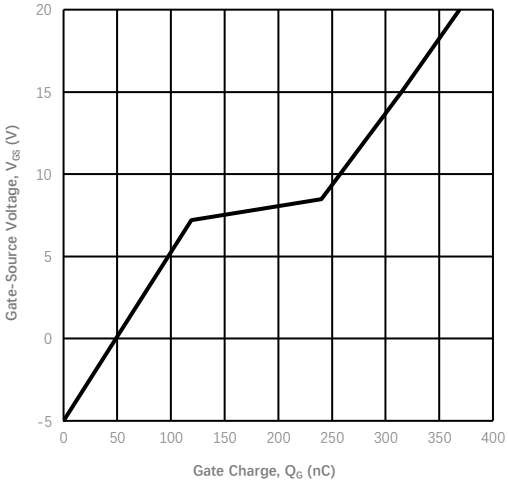


Figure 8

Gate Charge Characteristics

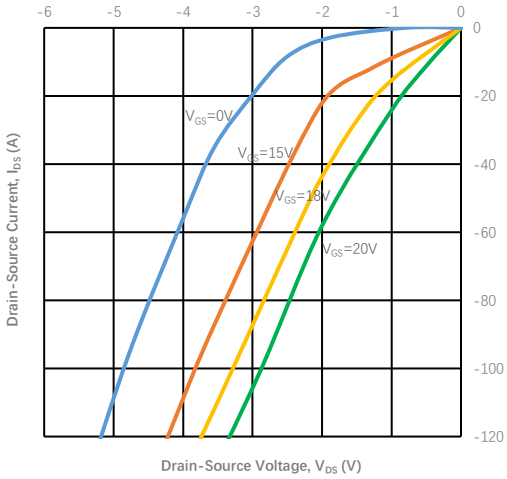


Figure 9

3rd Quadrant Characteristic at 25°C

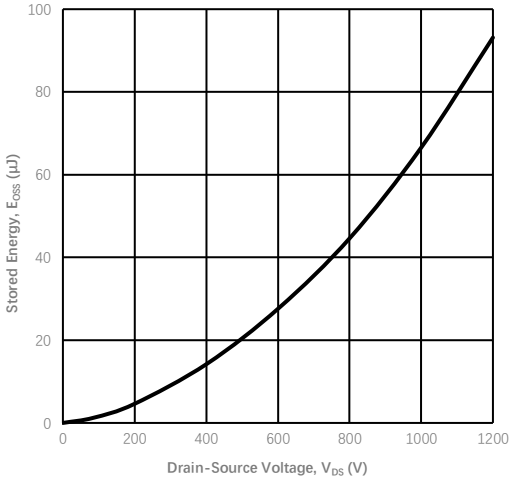


Figure 10

Output Capacitor Stored Energy

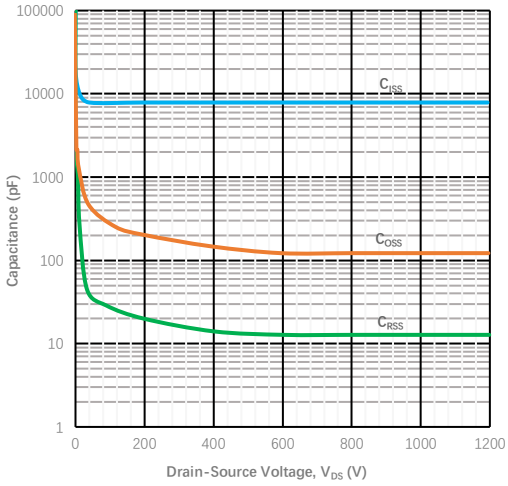


Figure 11

Capacitances vs. Drain-Source

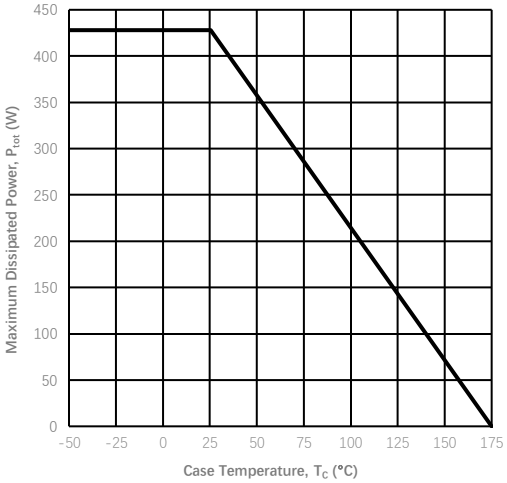


Figure 12

Max Power Dissipation Derating vs T_C

Typical Characteristics Diagrams

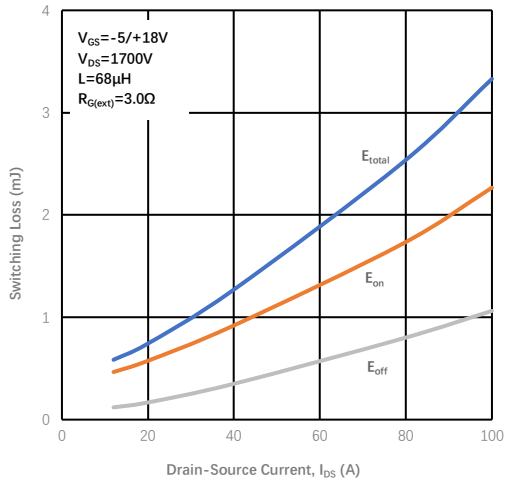


Figure 13

Switching Energy vs. Drain Current

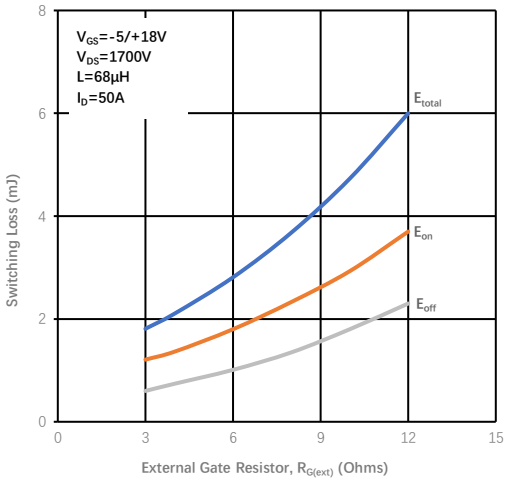


Figure 14

Switching Energy vs. $R_{G(ext)}$

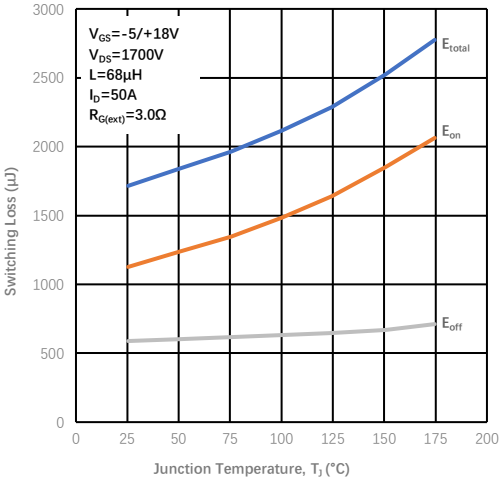


Figure 15

Switching Energy vs. Temperature

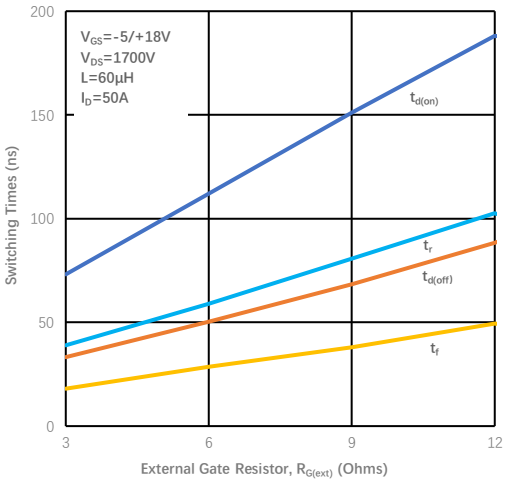


Figure 16

Switching Times vs. $R_{G(ext)}$

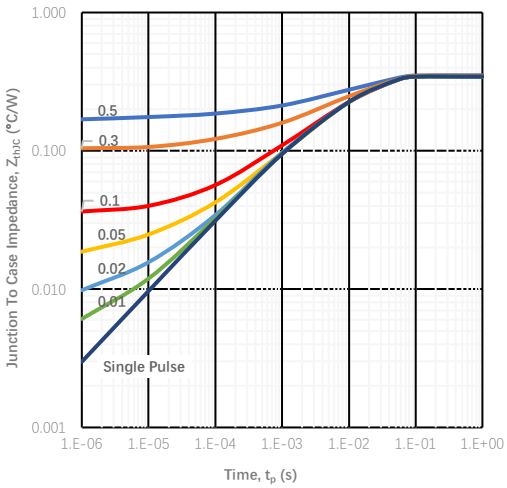


Figure 17

Transient Thermal Impedance

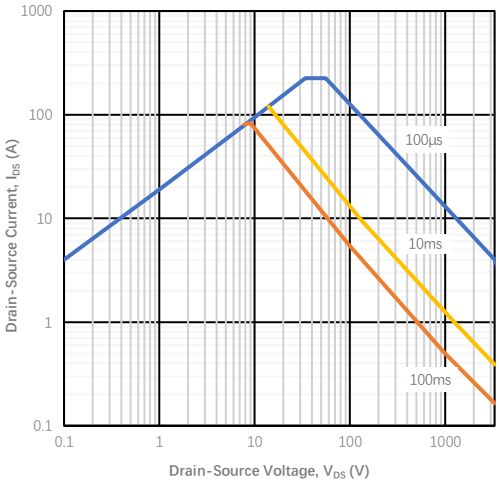
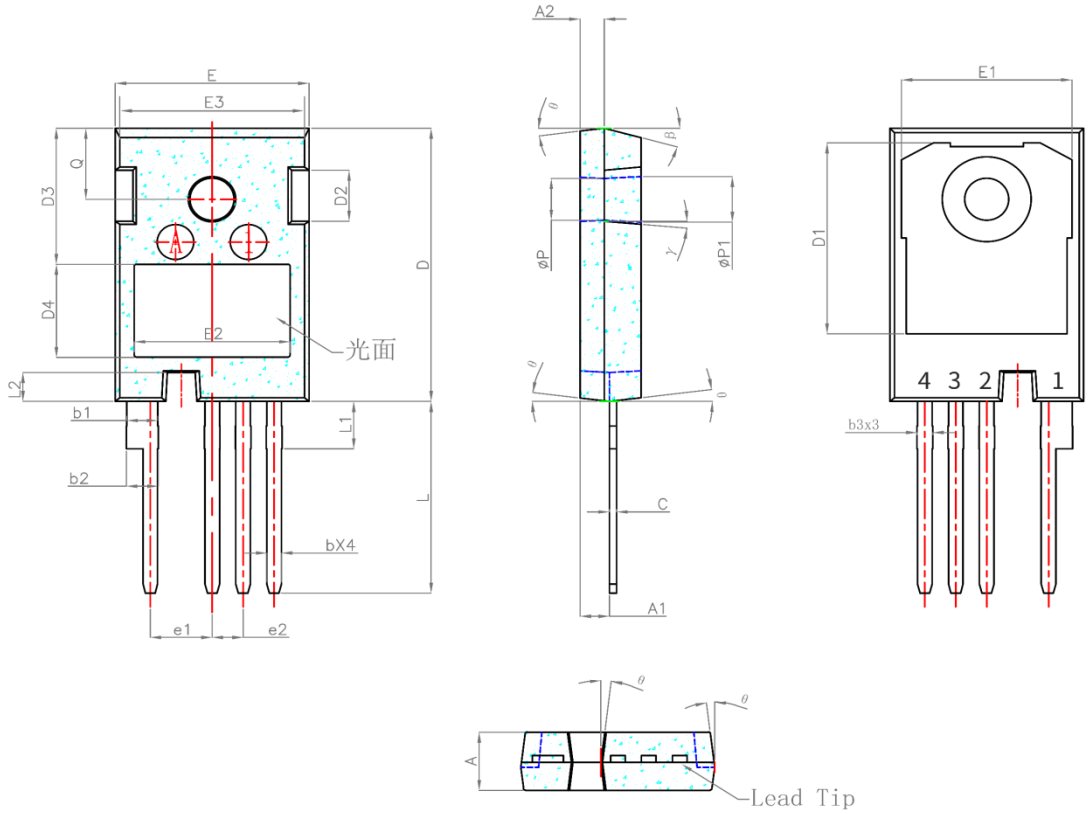


Figure 18

Safe Operating Area

Dimensions

TO-247-4L package



Symbol	Millimeters			Symbol	Millimeters		
	Min.	Type.	Max.		Min.	Type.	Max.
A	4.80	5.00	5.20	**e2**	2.39	2.54	2.69
A1	2.25	2.40	2.55	**E**	15.70	15.90	16.10
A2	1.85	2.00	2.15	**E1**	13.80	14.00	14.20
b	1.15	1.20	1.25	**E2**	12.80 Type.		
b1	2.40	2.55	2.70	**E3**	12.80	13.00	13.20
b2	2.48	2.63	2.78	**L**	16.32	16.52	16.72
b3	1.13	1.28	1.43	**L1**	3.87	4.07	4.27
c	0.55	0.60	0.65	**L2**	2.30	2.50	2.70
D	-	23.50	23.70	**ϕP**	3.45	3.60	-
D1	16.20	16.50	16.80	**ϕP1**	3.90 Type.		
D2	4.40 Type.			**Q**	6.01	6.11	6.21
D3	11.61	11.71	11.81	**θ**	7°		
D4	8.00 Type.			**β**	15°		
e1	4.93	5.08	5.23	**γ**	5°		

Pin	Symbol	Description
1	D	Drain
2	S	Source
3	KS	Kelvin Source
4	G	Gate
mb	D	Mounting Base; Connected to Drain

Note:

1. All metal surfaces are Sn plated (matte), except area of cut.
2. Burr or mold flash size (0.5 mm) is not included in the dimensions.

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