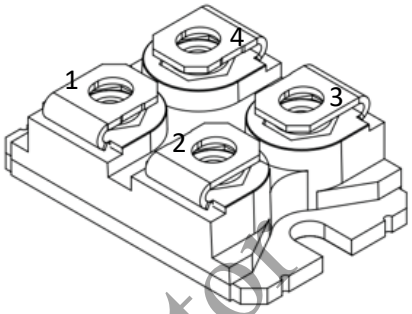
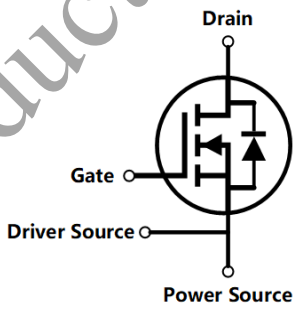
SiC MOSFET I3M12080SM

N-Channel Enhancement Mode



Features

- High Blocking Voltage with Low $R_{DS(on)}$
- Low Switching Losses
- Internal Isolation
- High Speed Switching
- Easy to Drive and Parallel



Applications

- High-frequency Switching Application
- DC/DC Converters
- Motor Drives
- Solar Inverters
- EV Charging
- UPS

Drain	3
Power Source	4
Driver Source	1
Gate	2

Standards Benefits

- Improve System Efficiency
- Improve Power Density
- Reduce System Size

RoHS

Halogen

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Order Information

Part Number	Package	Marking
I3M12080SM	SOT-227	I3M12080SM

Contents

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1. Maximum Ratings

At T_J= 25℃, unless specified otherwise

Parameter	Symbol	Value	Unit	Test Conditions
Drain - Source Voltage	V_{DSmax}	1200	V	V_{GS}=-4V I_D= 1mA
Gate - Source Voltage (Dynamic)	V_{GSmax}	-8 / +22	V	Duty cycle ≤ 1%
Gate - Source Voltage(static) turn-on gate voltage turn-off gate voltage	$V_{GS,on}$ $V_{GS,off}$	+15/+18 -4	V	Static
Continuous Drain Current	I_D	68	A	V_{GS} =18V T_C = 25℃ T_J = 175℃
		48		V_{GS} =18V T_C =100℃ T_J = 175℃
Power Dissipation	P_D	312	W	
Operating Junction Temperature	T_J	-55 To +175	℃	
Storage Temperature	T_{stg}	-55 To +150	℃	

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2. Electrical Characteristics

At T_J= 25℃, unless specified otherwise (Per Position)

Parameter	Symbol	Value			Unit	Test Conditions
		Min.	Typ.	Max.		
Drain-Source Breakdown Voltage	$V_{(BR)DSS}$	1200	/	/	V	V_{GS}=-4V I_D= 1mA
Gate Threshold Voltage	$V_{GS(th)}$	1.8	3.5	/	V	V_{DS}= V_{GS} I_D= 6mA
Reverse Bias Drain Current	I_{DSS}	/	1	100	μA	V_{GS}= -4V V_{DS}= 1200V
Gate-Source Leakage Current	I_{GSS}	/	1	100	nA	V_{GS}= 18V V_{DS}= 0V
Drain-Source On-State Resistance	$R_{DS(on)}$	/	40	/	mΩ	V_{GS}= 18V I_D= 20A T_J= 25℃
		/	53	/		V_{GS}= 18V I_D= 20A T_J= 125℃
		/	68	/		V_{GS}= 18V I_D= 20A T_J= 175℃
Internal Gate Resistance	$R_{G(int)}$	/	1.9	/	Ω	f= 100kHz V_{AC}= 25mV
Coss Stored Energy	E_{oss}	/	42	/	μJ	V_{DS}= 800V f= 100kHz
Input Capacitance	C_{iss}	/	2425	/	pF	V_{GS}= 0V V_{DS}= 800V f= 100kHz V_{AC}= 25mV
Output Capacitance	C_{oss}	/	107	/	pF	
Reverse Transfer Capacitance	C_{rss}	/	13	/	pF	

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Parameter	Symbol	Value			Unit	Test Conditions
		Min.	Typ.	Max.		
Gate to Source Charge	Q_{gs}	/	18	/	nC	V_{DS}= 800V I_{DS}= 30A V_{GS}= -3 to 18V I_G= 20mA
Gate to Drain Charge	Q_{gd}	/	30	/		
Total Gate Charge	Q_g	/	92	/		

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3. Reverse Diode Characteristics

At T_J= 25℃, unless specified otherwise (Per Position)

Parameter	Symbol	Value		Unit	Test Conditions
		Typ.	Max.		
Diode Forward Voltage	V_{SD}	5.0	/	V	V_{GS}= -4V I_{SD}= 10A T_J= 25℃
		4.5	/	V	V_{GS}= -4V I_{SD}= 10A T_J= 175℃

4. Thermal Characteristics

Parameter	Symbol	Value	Unit
Thermal Resistance from Junction to Case	$R_{\theta JC}$	0.48	℃/W

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5. Typical Performance

At T_J= 25℃, unless specified otherwise

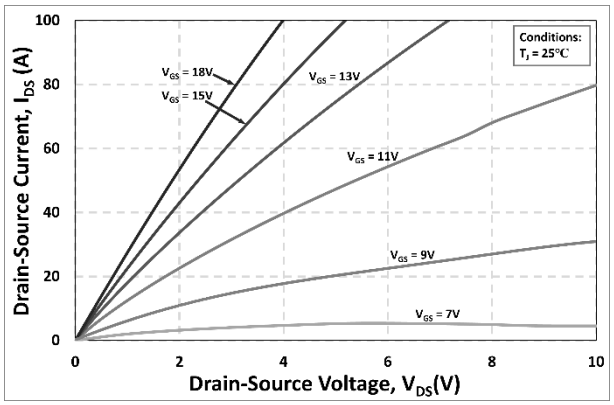

Figure 1. Output Characteristics T_J = 25℃

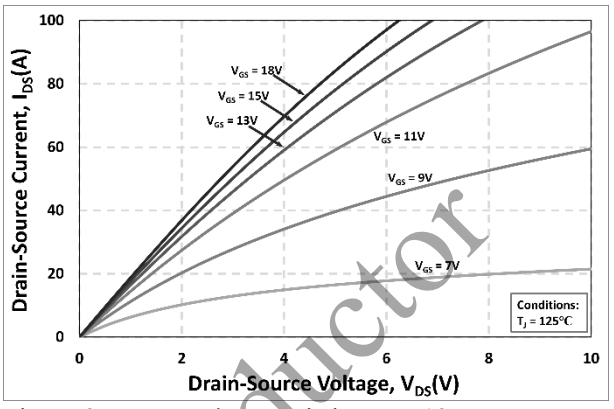

Figure 2. Output Characteristics T_J = 125℃

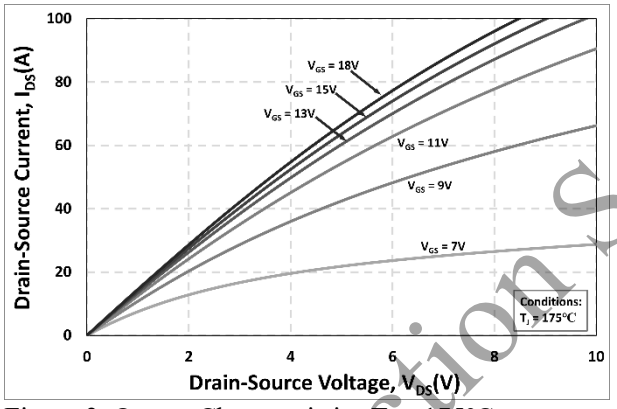

Figure 3. Output Characteristics T_J = 175℃

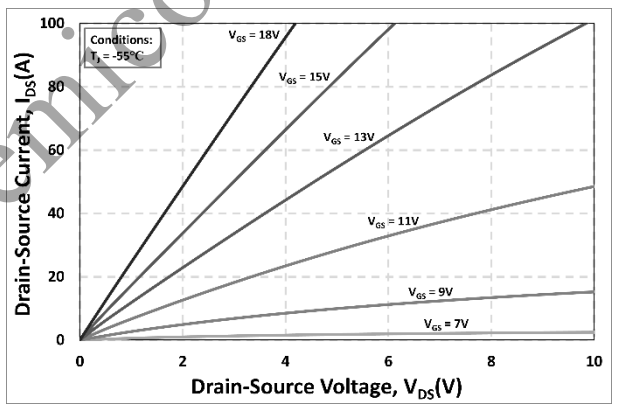

Figure 4. Output Characteristics T_J = -55℃

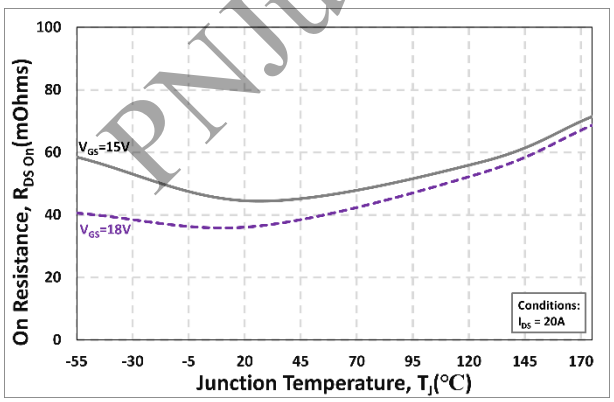

Figure 5. On-Resistance vs. Temperature

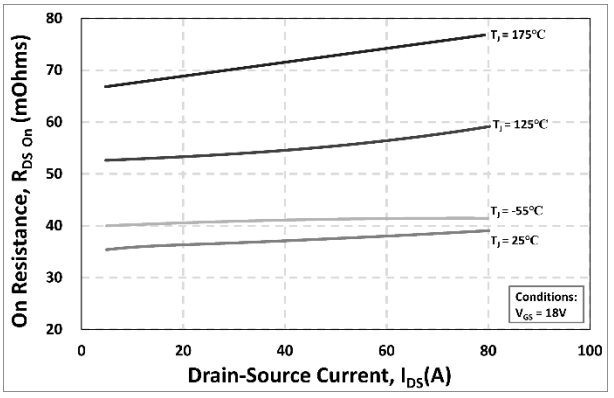

Figure 6. On-Resistance vs. Drain Current Various Temperatures

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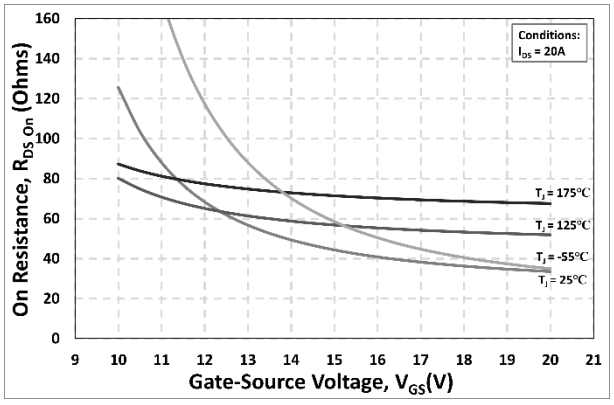

Figure 7. On-Resistance vs. Gate-Source Voltage

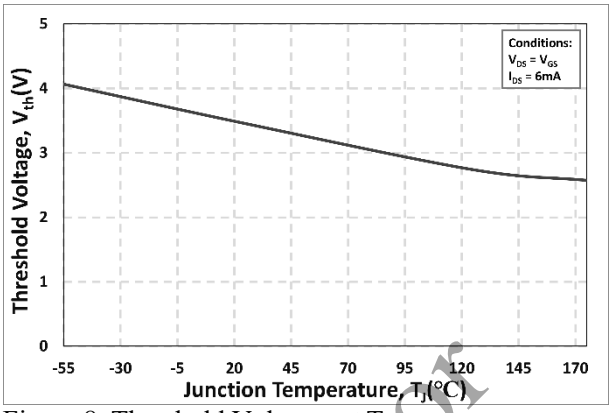

Figure 8. Threshold Voltage vs. Temperature

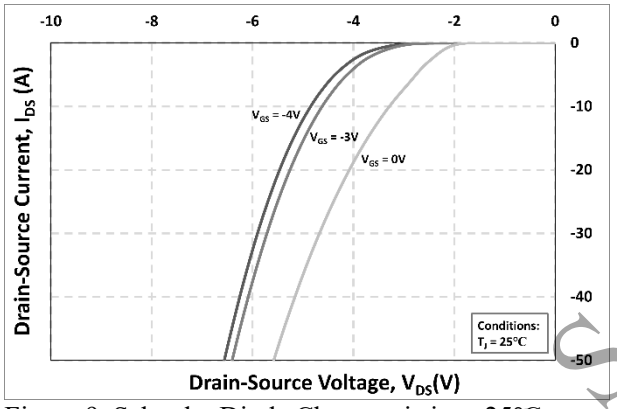

Figure 9. Schottky Diode Characteristic at 25°C

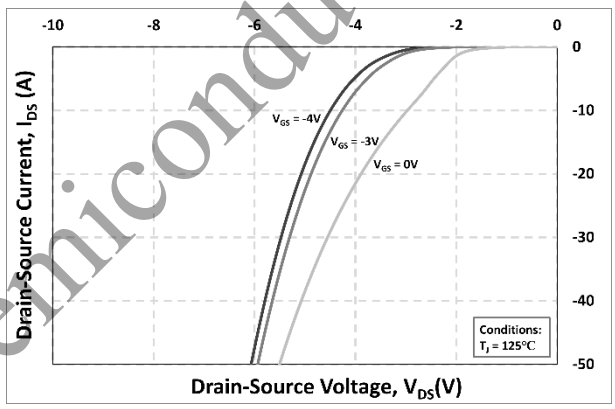

Figure 10. Schottky Diode Characteristic at 125°C

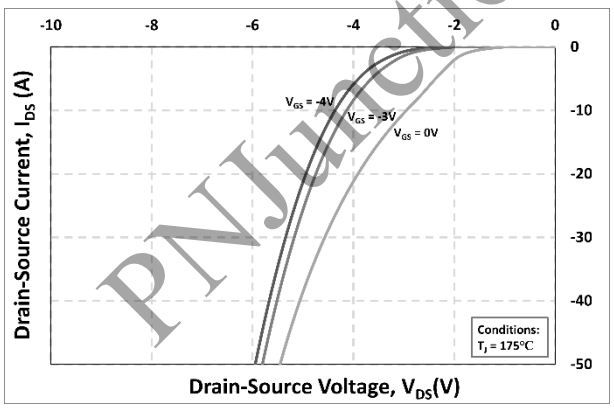

Figure 11. Schottky Diode Characteristic at 175°C

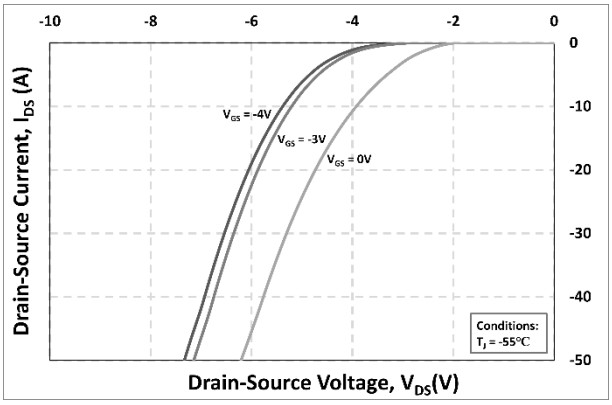

Figure 12. Schottky Diode Characteristic at -55°C

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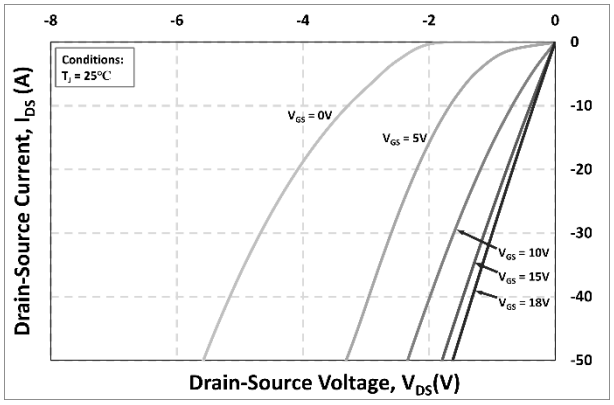

Figure 13. 3rd Quadrant Characteristic at 25°C

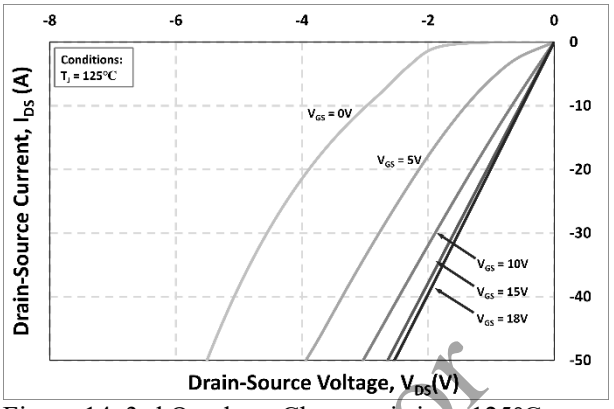

Figure 14. 3rd Quadrant Characteristic at 125°C

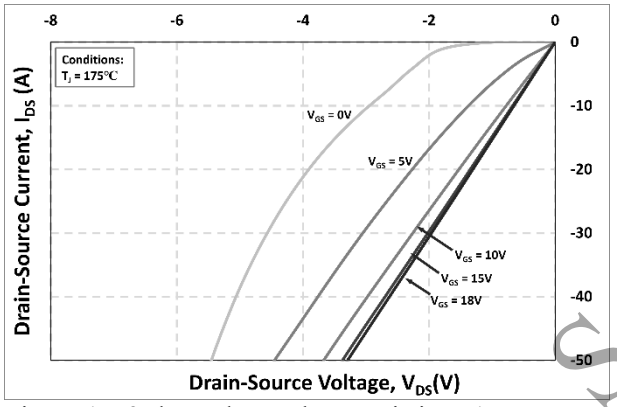

Figure 15. 3rd Quadrant Characteristic at 175°C

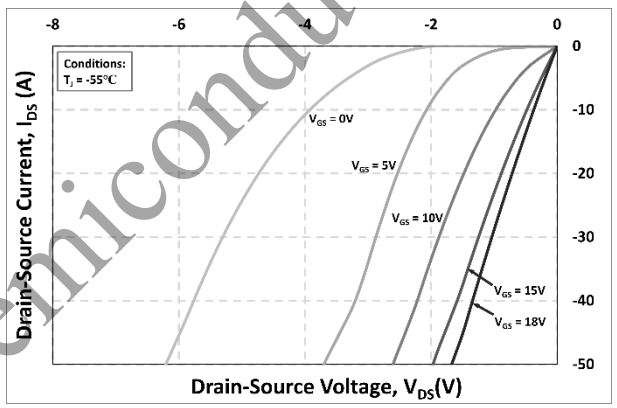

Figure 16. 3rd Quadrant Characteristic at -55°C

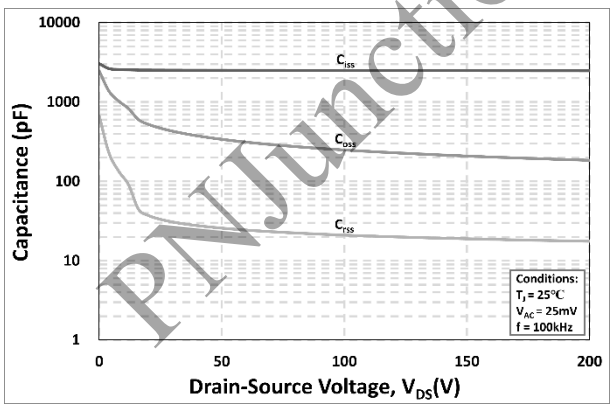

Figure 17. Capacitances vs. Drain-Source Voltage (0 - 200V)

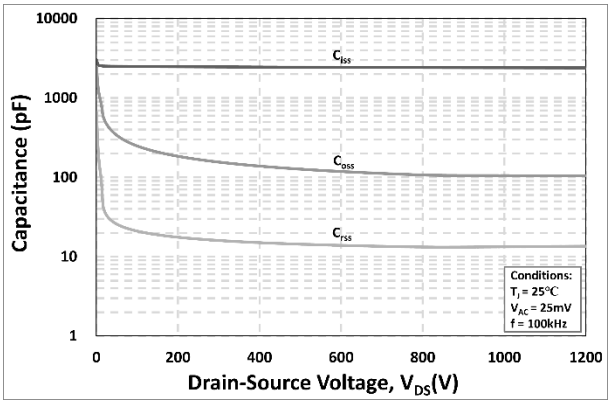

Figure 18. Capacitances vs. Drain-Source Voltage (0 - 1200V)

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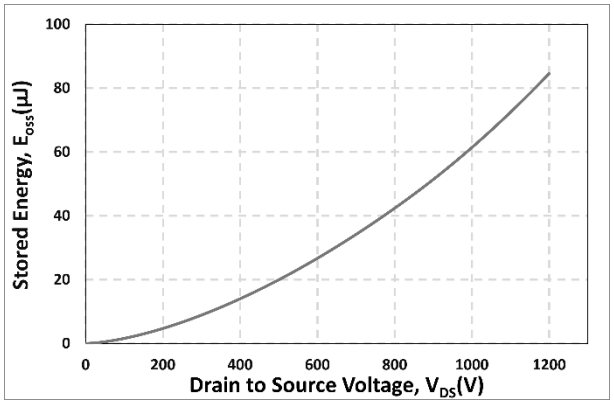

Figure 19. Output Capacitor Stored Energy

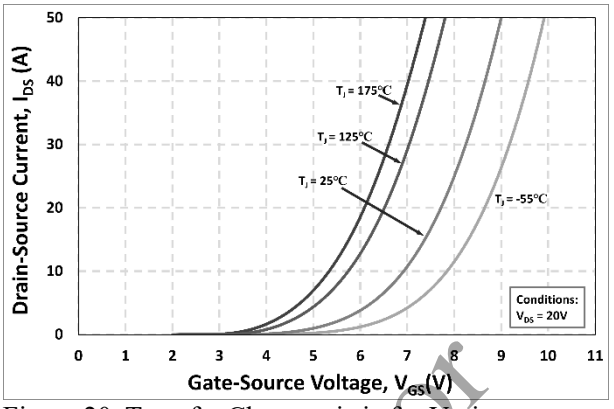

Figure 20. Transfer Characteristic for Various Junction Temperatures

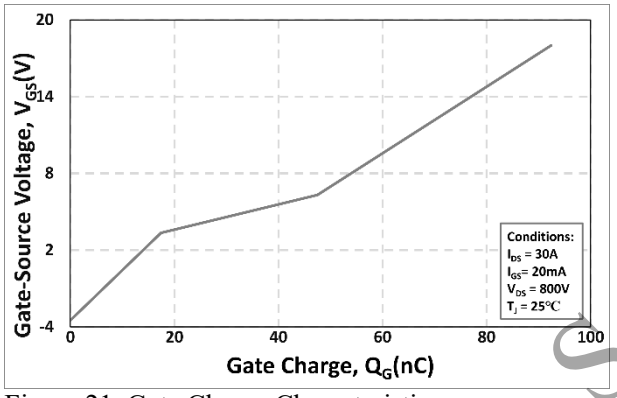

Figure 21. Gate Charge Characteristics

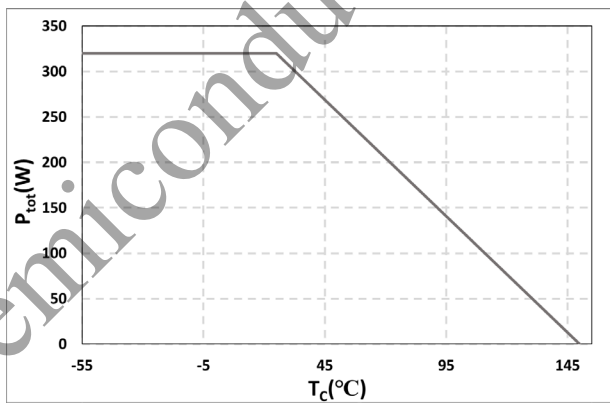

Figure 22. Maximum Power Dissipation Derating vs. Case Temperature

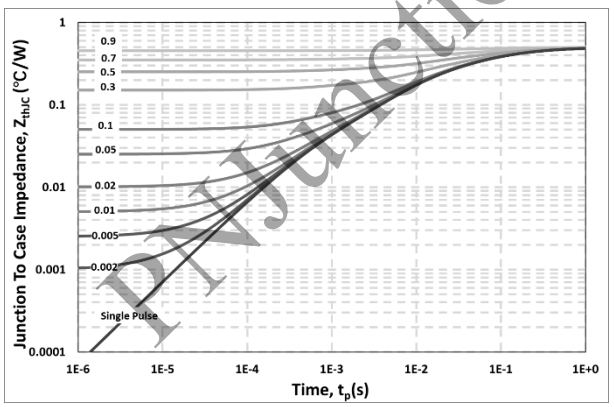

Figure 23. Transient Thermal Impedance (Junction - Case)

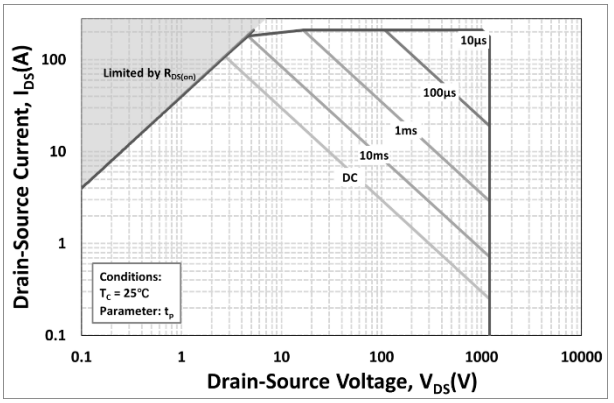

Figure 24. Forward Bias Safe Operating Area (FBSOA)

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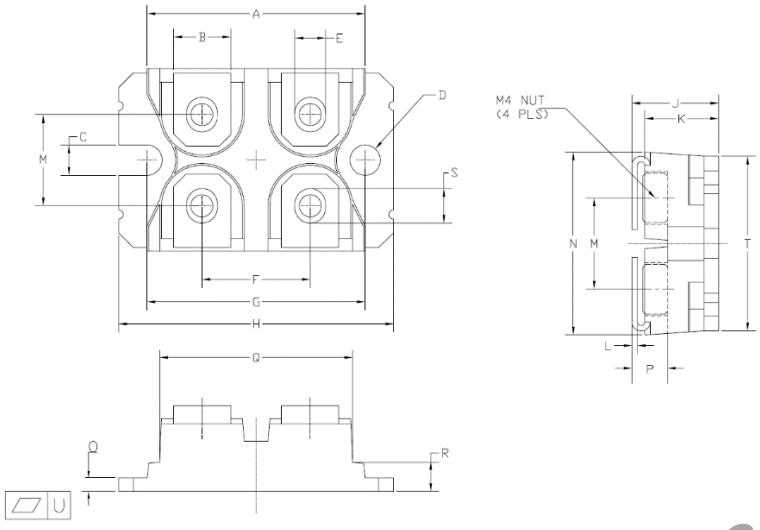
6. Package Outlines



SYMBOL	MIN.	NOM.	MAX.
A	31.50	31.69	31.88
B	7.80	8.00	8.20
C	4.09	4.19	4.29
D	4.09	4.19	4.29
E	4.09	4.19	4.29
F	14.91	15.01	15.11
G	30.12	30.21	30.30
H	38.00	38.11	38.23
J	11.68	11.95	12.22
K	8.92	9.26	9.60
L	0.76	0.80	0.84
M	12.60	12.73	12.85
N	25.15	25.29	25.42
O	2.00	2.06	2.13
P	4.95	5.46	5.97
Q	26.54	26.72	26.90
R	3.94	4.18	4.42
S	4.72	4.79	4.85
T	24.59	24.83	25.07
U	-0.05	0.03	0.10

Drawing and Dimensions

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