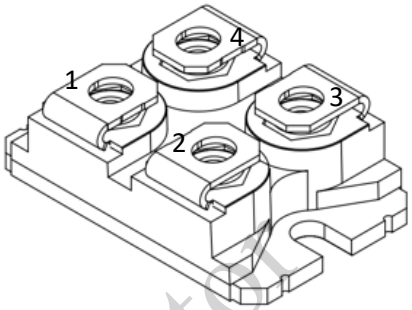
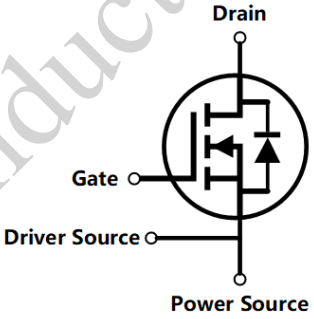
SiC MOS I3M12016MB

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

Order Information

Part Number	Package	Marking
I3M12016MB	SOT-227	I3M12016MB

Contents

Features 1
Applications 1
Standards Benefits 1
Order Information 1
Contents 2
1. Maximum Ratings 3
2. Electrical Characteristics 4
3. Reverse Diode Characteristics 6
4. Thermal Characteristics 6
5. Typical Performance 7
6. Package Outlines 12

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}=0V I_D= 100μA
Gate - Source Voltage (Dynamic)	V_{GSmax}	-8 / +21	V	AC (f >1Hz)
Gate - Source Voltage(static) turn-on gate voltage turn-off gate voltage	 $V_{GS,on}$ $V_{GS,off}$	 +15/+18 -3	V	Static
Continuous Drain Current	I_D	90	A	V_{GS} =18V T_C = 25℃ T_J = 175℃
		68		V_{GS} =18V T_C =100℃ T_J = 175℃
Power Dissipation	P_D	300	W	
Operating Junction Temperature	T_J	-40 To +175	℃	
Storage Temperature	T_{stg}	-40 To +150	℃	

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}=0V I_D= 100μA
Gate Threshold Voltage	$V_{GS(th)}$	1.8	2.6	/	V	V_{DS}= V_{GS} I_D= 20mA
Reverse Bias Drain Current	I_{DSS}	/	2	200	μA	V_{GS}= 0V V_{DS}= 1200V
Gate-Source Leakage Current	I_{GSS}	/	10	500	nA	V_{GS}= 18V V_{DS}= 0V
Drain-Source On-State Resistance	$R_{DS(on)}$	/	20	26	mΩ	V_{GS}= 15V I_D= 50A T_J= 25℃
		/	26	/		V_{GS}= 15V I_D= 50A T_J= 175℃
		/	16	23		V_{GS}= 18V I_D= 50A T_J= 25℃
		/	23	/		V_{GS}= 18V I_D= 50A T_J= 175℃
Internal Gate Resistance	$R_{G(int)}$	/	1.1	/	Ω	f= 1MHz V_{AC}= 25mV
Coss Stored Energy	E_{oss}	/	110	/	μJ	V_{DS}= 800V f= 500kHz
Input Capacitance	C_{iss}	/	7140	/	pF	V_{GS}= 0V V_{DS}= 800V f= 500kHz V_{AC}= 25mV
Output Capacitance	C_{oss}	/	280	/	pF	

Parameter	Symbol	Value			Unit	Test Conditions
		Min.	Typ.	Max.		
Reverse Transfer Capacitance	C_{rss}	/	29	/	pF	
Gate to Source Charge	Q_{gs}	/	81	/	nC	V_{DS}= 800V I_{DS}= 50A V_{GS}= -3 to 18V I_G= 5mA
Gate to Drain Charge	Q_{gd}	/	80	/		
Total Gate Charge	Q_g	/	249	/		
Turn-on Energy	E_{on}	/	592	/	μJ	V_{DS}= 800V I_{DS}= 50A V_{GS}= -3V/18V R_G= 1.0Ω L= 100μH
Turn-off Energy	E_{off}	/	187	/		
Turn-On Delay Time	$T_{d(on)}$	/	25.8	/	ns	
Rise Time	T_r	/	31.7	/		
Turn-Off Delay Time	$T_{d(off)}$	/	44.3	/		
Fall Time	T_f	/	15.4	/		

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}	6.1	/	V	V_{GS}= -3V I_{SD}= 50A T_J= 25℃
		3.9	/	V	V_{GS}= -3V I_{SD}= 50A T_J= 175℃
Reverse Recover Time	t_{rr}	27	/	ns	V_{GS}= -3/18V I_{SD}= 50A V_{DS}= 800V d_{if}/d_t= 4100A/μs R_G =1.0Ω T_J= 25℃
Reverse Recovery Charge	Q_{rr}	1152	/	μC	
Peak Reverse Recovery Current	I_{rrm}	68	/	A	
Reverse Recovery Energy	E_{RR}	677	/	uJ	

4. Thermal Characteristics

Parameter	Symbol	Value	Unit
Thermal Resistance from Junction to Case	$R_{\theta JC}$	0.50	℃/W

5. Typical Performance

At T_J= 25℃, unless specified otherwise

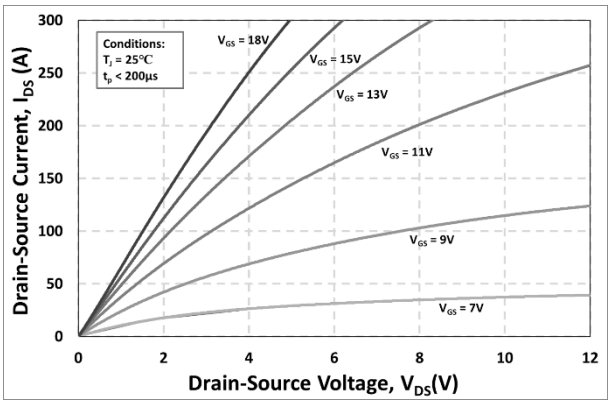


Figure 1. Output Characteristics T_J = 25℃

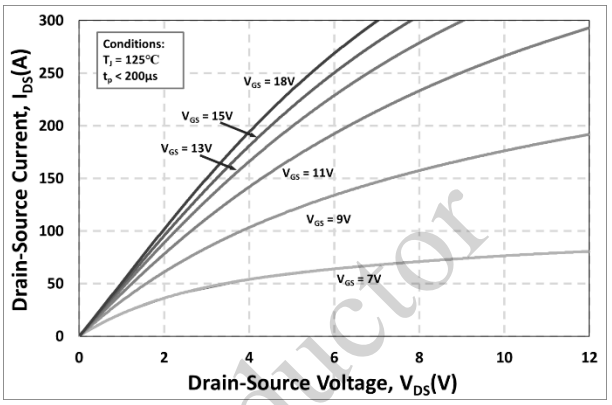


Figure 2. Output Characteristics T_J = 125℃

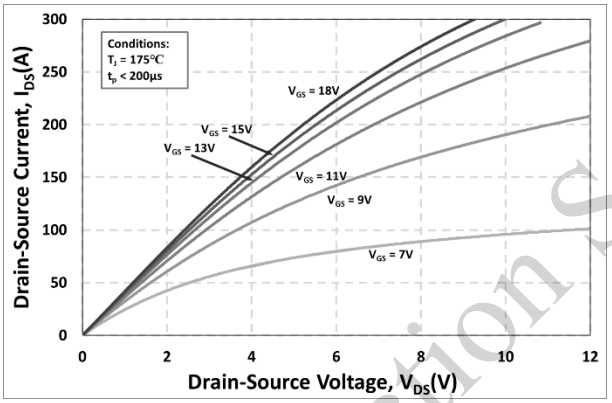


Figure 3. Output Characteristics T_J = 175℃

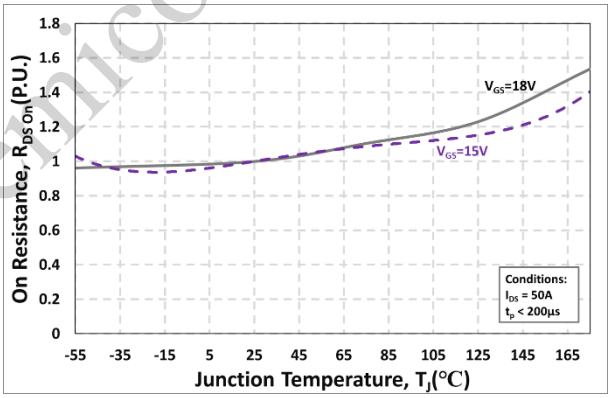


Figure 4. Normalized On-Resistance vs. Temperature

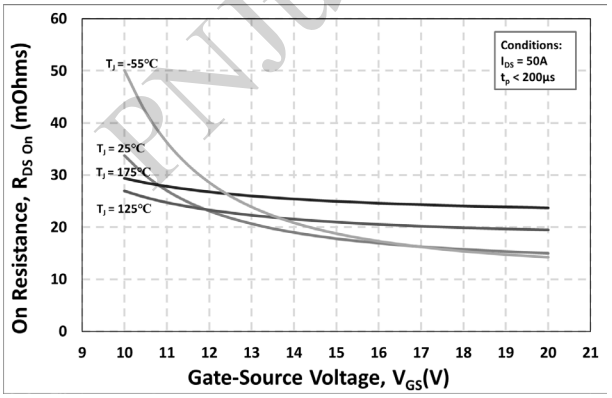


Figure 5. On-Resistance vs. Gate-Source Voltage

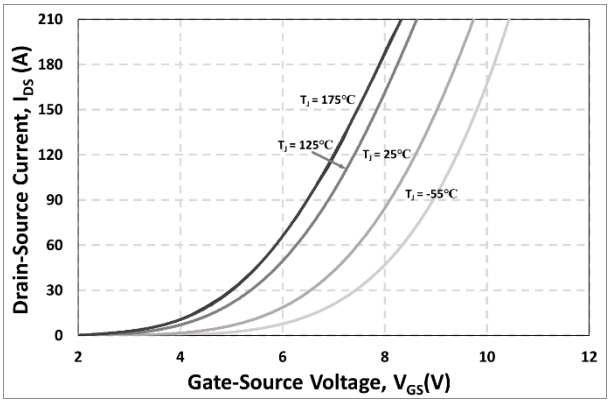


Figure 6. Transfer Characteristic for Various Junction Temperatures

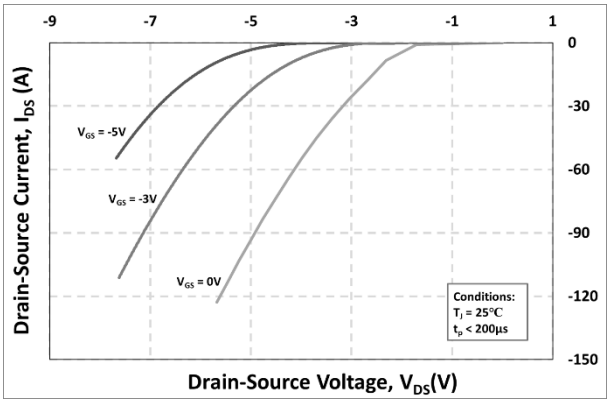


Figure 7. Body Diode Characteristic at 25°C

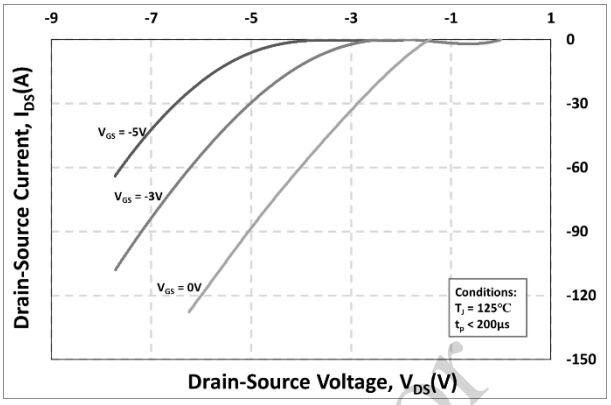


Figure 8. Body Diode Characteristic at 125°C

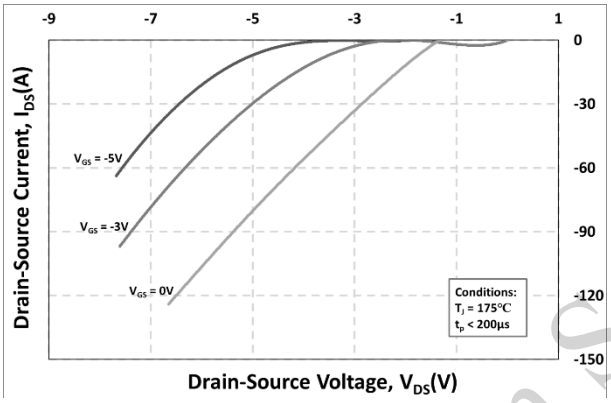


Figure 9. Body Diode Characteristic at 175°C

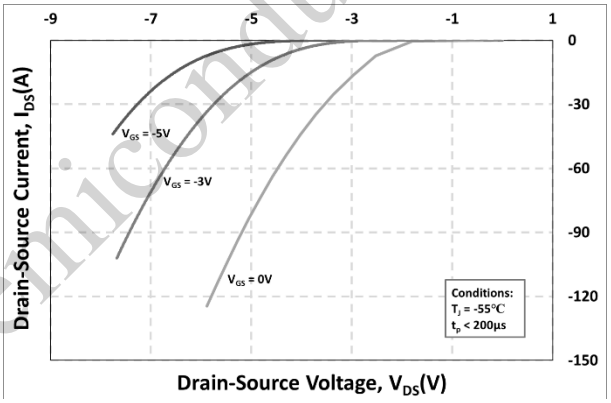


Figure 10. Body Diode Characteristic at -55°C

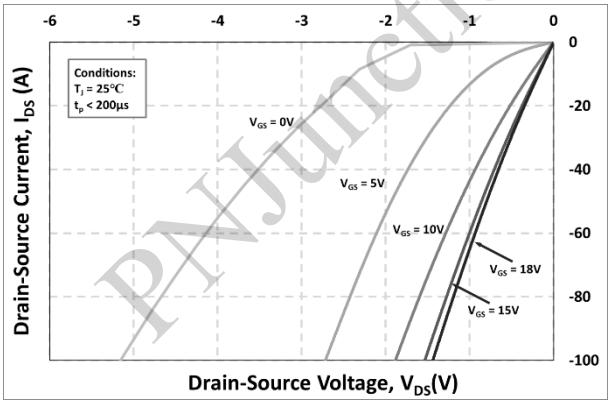


Figure 11. 3rd Quadrant Characteristic at 25°C

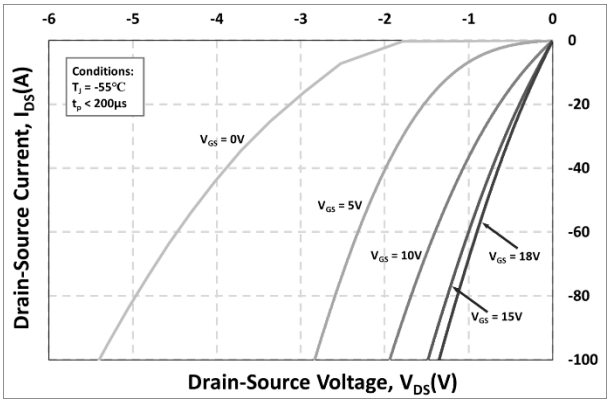


Figure 12. 3rd Quadrant Characteristic at -55°C

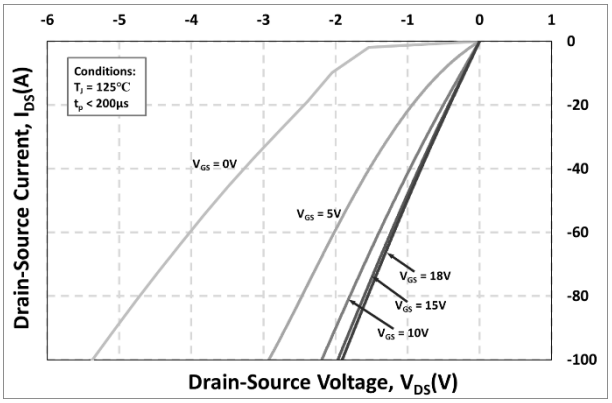


Figure 13. 3rd Quadrant Characteristic at 125°C

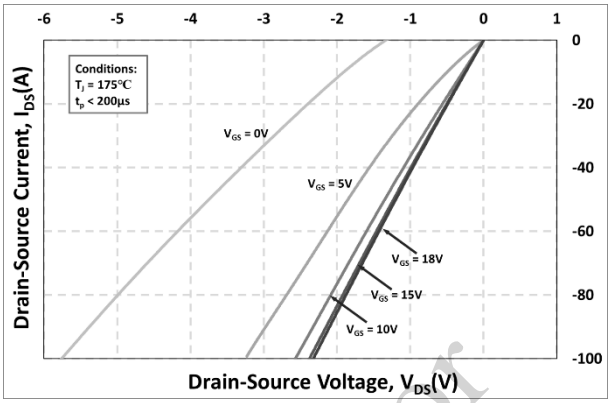


Figure 14. 3rd Quadrant Characteristic at 175°C

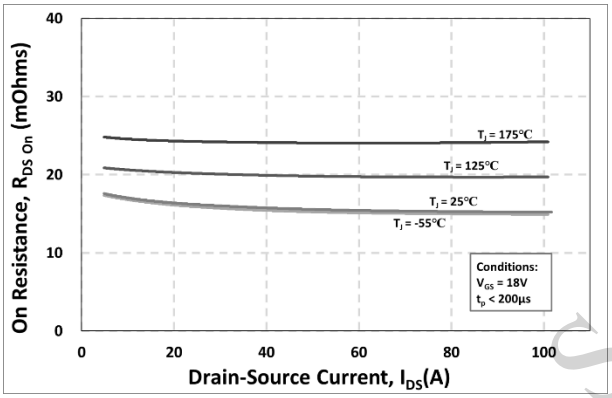


Figure 15. On-Resistance vs. Drain Current Various Temperatures

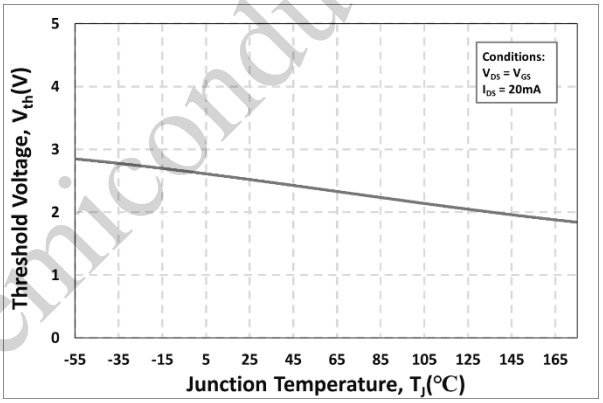


Figure 16. Threshold Voltage vs. Temperature

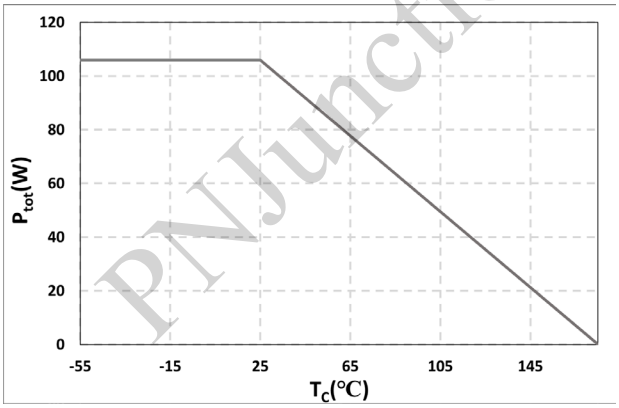


Figure 17. Maximum Power Dissipation Derating vs. Case Temperature

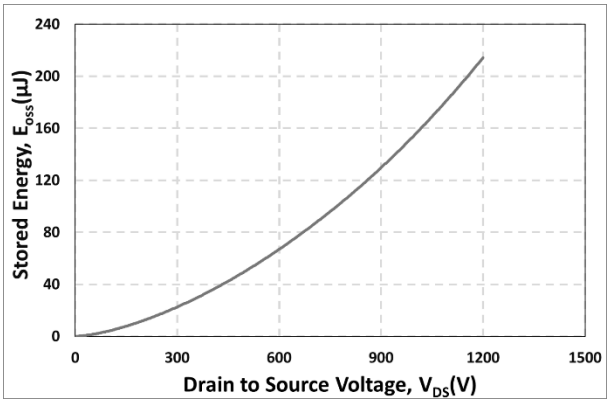


Figure 18. Output Capacitor Stored Energy

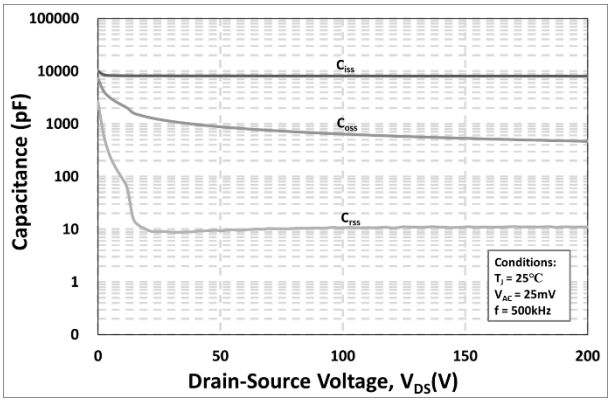


Figure 19. Capacitances vs. Drain-Source Voltage (0 - 200V)

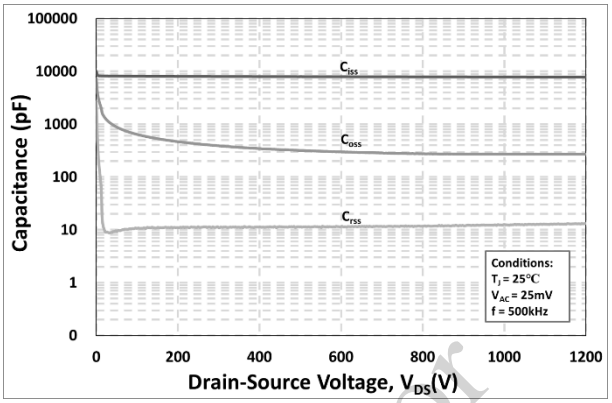


Figure 20. Capacitances vs. Drain-Source Voltage (0 - 1200V)

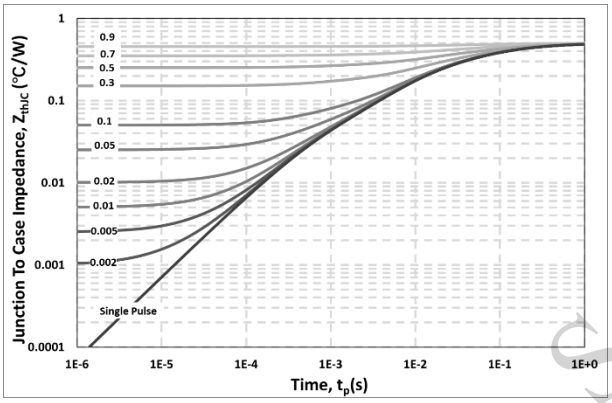


Figure 21. Capacitances vs. Drain-Source Voltage (0 - 1200V)

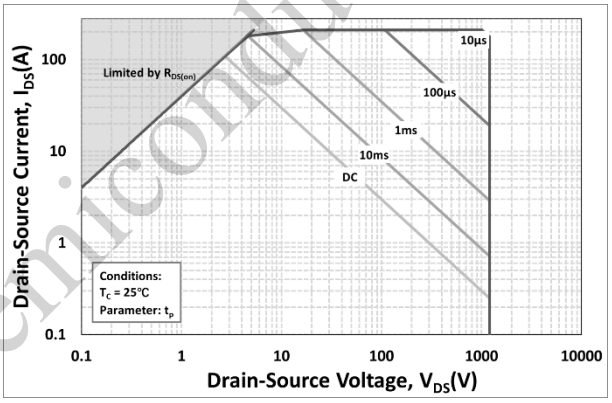


Figure 22. Capacitances vs. Drain-Source Voltage (0 - 1200V)

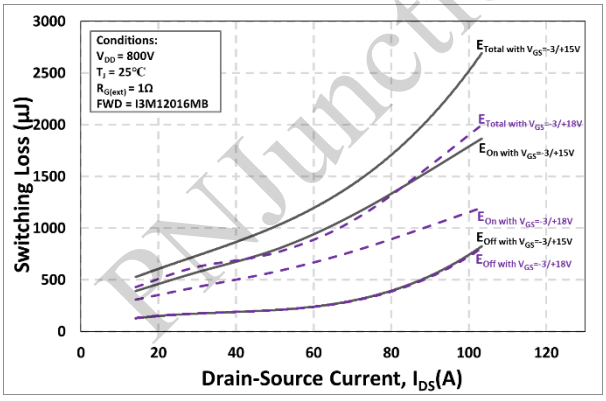


Figure 17. Switching Loss vs. Drain-Source Current (VDS = 800 V)

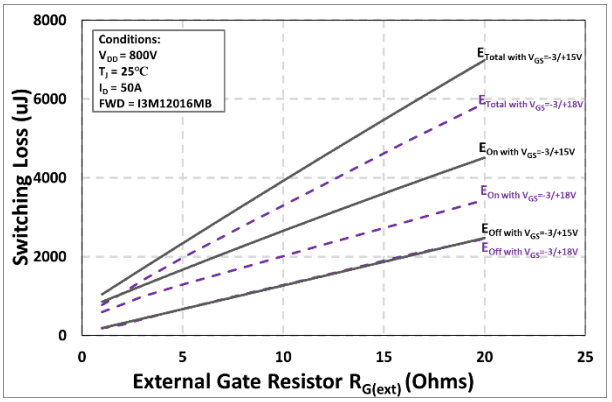


Figure 18. Switching Loss vs. External Gate Resistance

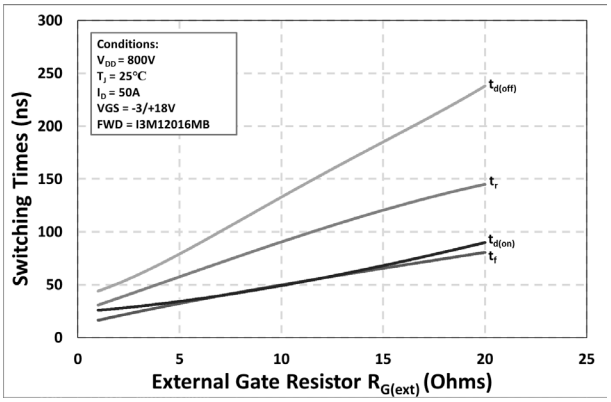


Figure 19. Switching Times vs. External Gate Resistance

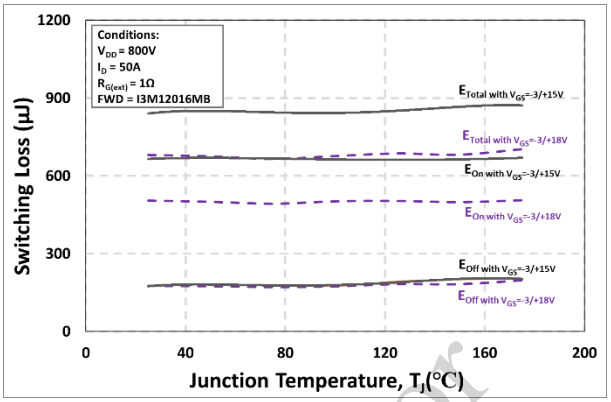
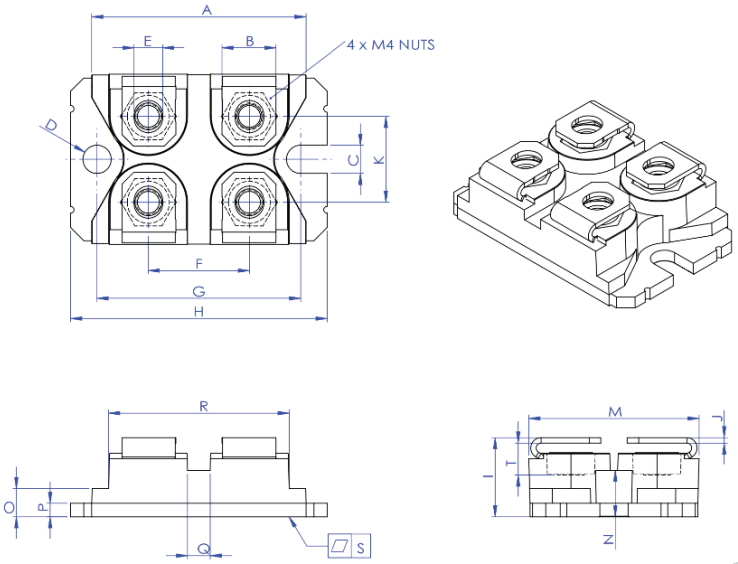


Figure 20. Clamped Inductive Switching Energy vs. Temperature

6. Package Outlines



Dimension	Millmeter		Typical
	Min	Max	
A	31.50	32.00	31.70
B	7.70	8.30	8.00
C	4.10	4.30	4.20
D	4.10	4.30	4.20
E	4.10	4.30	4.20
F	14.90	15.15	15.0
G	29.80	30.40	30.10
H	37.80	38.30	38.05
I	11.80	12.30	12.05
J	0.75	0.85	0.80
K	12.50	13.00	12.75
M	25.00	25.50	25.30
N	6.75	7.10	6.90
O	4.00	4.40	4.20
P	1.90	2.10	2.00
Q	3.20	3.60	3.40
R	26.60	27.00	26.80
S	-0.03	0.10	0.01
T	4.85	5.25	5.05

Drawing and Dimensions

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