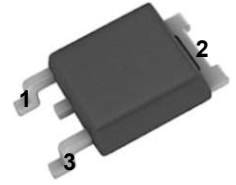
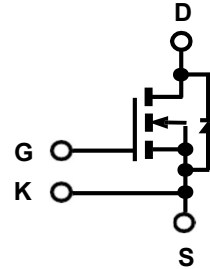


ICE260M80D Silicon Carbide Power MOSFET

Features

- 800V 260mohm SiC MOSFET
- Optimized switching performance
- Fast body diode with low Q_{rr} ensures robust commutation
- Superior thermal performance
- Low $R_{DS(on)}$ and weak temperature dependence of pulse current
- Compatible with Si-MOSFET drive
- Optimized design for high performance power systems

Product Summary			
I_D	$T_A=25^\circ\text{C}$	12.2A	Max
$V_{(BR)DSS}$	$T_C=25^\circ\text{C}$	800V	Min
$r_{DS(on)}$	$V_{GS}=18\text{V}$	260m Ω	Typ
Q_g	$V_{DS}=400\text{V}$	12.5nC	Typ



T0252

Standard Metal Heatsink

1=Gate, 2=Drain, 3=Source.



Maximum ratings^a, at $T_j=25^\circ\text{C}$, unless otherwise specified

Parameter	Symbol	Conditions	Value	Unit
Continuous drain current	I_D	$T_c=25^\circ\text{C}$	12.2	A
		$T_c=100^\circ\text{C}$	8.6	
Pulsed drain current	$I_{D, \text{pulse}}$		36	A
Maximum gate source voltage	$V_{GS(max)}$		-10/+22	V
Operational gate source voltage	$V_{GS \text{ op}}$		-5/+18	V
Single pulsed Avalanche energy	E_{AS}	$L=10\text{mH}$, $V_{DD}=50\text{V}$, $I_{AS}=2.5\text{A}$, $R_G=50\Omega$	31	mJ
Power dissipation	P_{tot}		57.6	W
Storage temperature	T_{stg}		-55 to +175	$^\circ\text{C}$
Operating temperature	T_j			

^a Pulse width limited by T_{jmax}

Parameter	Symbol	Conditions	Values			Unit
			Min	Typ	Max	

Thermal characteristics

Thermal resistance, junction-case	R_{thJC}		-	-	2.6	°C/W
Thermal resistance, junction-ambient	R_{thJA}	leaded	-	-	60	
Soldering temperature, wave soldering only allowed at leads	T_{sold}	1.6mm (0.063in.) from case for 10 s	-	-	260	°C

Electrical characteristics^a, at $T_i=25^{\circ}\text{C}$, unless otherwise specified

Static characteristics

Drain-source breakdown voltage	$V_{(BR)DSS}$	$V_{GS}=0V, I_D=100\mu A$	800	-	-	V
Gate threshold voltage	$V_{GS(th)}$	$V_{DS}=V_{GS}, I_D=1.33mA$	2.6	3.6	4.6	
		$V_{DS}=V_{GS}, I_D=1.33mA, T_j=175^{\circ}\text{C}$	-	2.8	-	
Zero gate voltage drain current	I_{DSS}	$V_{DS}=800V, V_{GS}=0V$	-	5	100	μA
Gate source leakage current	I_{GSS}	$V_{GS}=+18V, V_{DS}=0V$	-	-	250	nA
Drain-source on-state resistance	$R_{DS(on)}$	$V_{GS}=18V, I_D=4.5A$	-	260	360	m Ω
		$V_{GS}=18V, I_D=4.5A, T_j=175^{\circ}\text{C}$	-	275	-	
Gate resistance	R_G	$f=1\text{ MHz}, V_{AC}=25mV$	-	6.5	-	Ω

Dynamic characteristics

Input capacitance	C_{iss}	$V_{DS}=400V, V_{GS}=0V, f=100\text{ kHz}, V_{AC}=25mV$	-	252	-	pF
Output capacitance	C_{oss}		-	28	-	
Reverse transfer capacitance	C_{rss}		-	6	-	
C_{OSS} stored energy	E_{oss}		-	2.8	-	μJ
Forward transconductance	g_{FS}	$V_{DS}=10V, I_D=4.5A$	-	2.4	-	S
Turn-on delay time	$t_{d(on)}$	$V_{DS}=400V, V_{GS}=-4/+18V, I_D=4.5A, R_G=20\Omega$ (External), $L=100\mu H$	-	8.2	-	ns
Rise time	t_r		-	14.2	-	
Turn-off delay time	$t_{d(off)}$		-	12	-	
Fall time	t_f		-	7.2	-	
Turn-on switching energy	E_{ON}	Diode: Body Diode at $V_{GS}=-4V$	-	27	-	μJ
Turn-off switching energy	E_{OFF}		-	5.7	-	

Parameter	Symbol	Conditions	Values			Unit
			Min	Typ	Max	

Dynamic characteristics

Turn-on delay time	$t_{d(on)}$	$V_{DS}=400V, V_{GS}=-4/+18V,$ $I_D=4.5A, R_G=20\Omega$ (External), $L=100\mu H,$ $T_j=175^\circ C$	-	7.2	-	ns
Rise time	t_r		-	13.8	-	
Turn-off delay time	$t_{d(off)}$		-	12.4	-	
Fall time	t_f		-	6.6	-	
Turn-on switching energy	E_{ON}	Diode: Body Diode at $V_{GS}=-4V$ $T_j=175^\circ C$	-	30.8	-	μJ
Turn-off switching energy	E_{OFF}		-	5.7	-	

Gate Charge Characteristics

Gate to source charge	Q_{gs}	$V_{DS}=400V, I_D=4.5A,$ $V_{GS}=-4$ to $+18V$	-	3	-	nC
Gate to drain charge	Q_{gd}		-	8	-	
Gate charge total	Q_g		-	12.5	-	

Reverse Diode

Continuous forward current	I_S	$V_{GS}=-4V$	-	-	12.2	A
Diode forward voltage	V_{SD}	$V_{GS}=-4V, I_{SD}=2.5A$	-	4.4	-	V
		$V_{GS}=-4V, I_{SD}=2.5A,$ $T_j=175^\circ C$	-	3.8	-	
Reverse recovery time	t_{rr}	$V_{GS}=-4V, V_{RR}=400V,$ $I_{SD}=4.5A,$ $d_{iF}/d_t=800 A/\mu s$	-	17.2	-	ns
Reverse recovery charge	Q_{rr}		-	21.3	-	nC
Peak reverse recovery current	I_{rm}		-	3	-	A

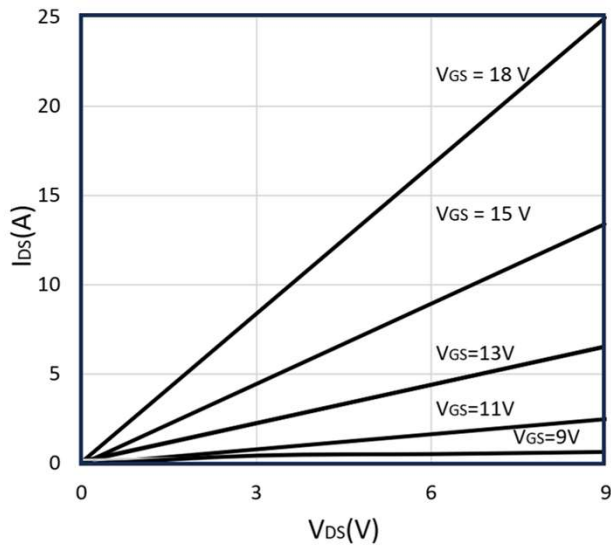


Figure 1: Output Characteristics $T_J = -40^\circ\text{C}$

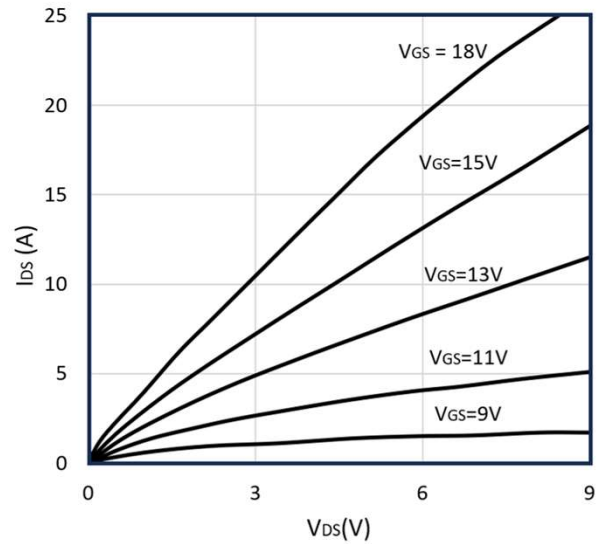


Figure 2 : Output Characteristics $T_J = 25^\circ\text{C}$

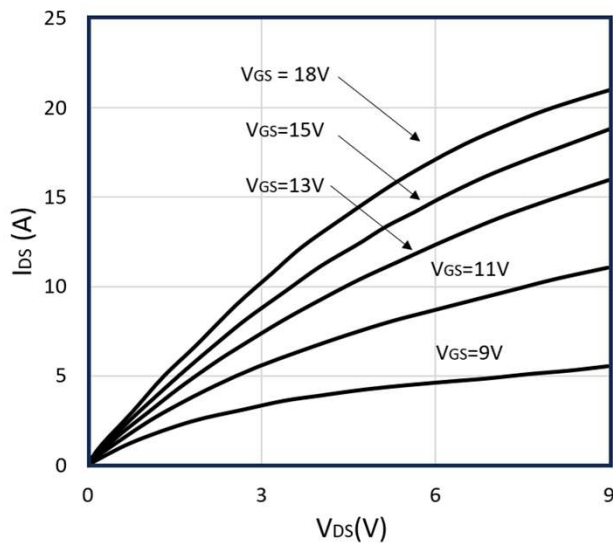


Figure 3 : Output Characteristics $T_J = 175^\circ\text{C}$

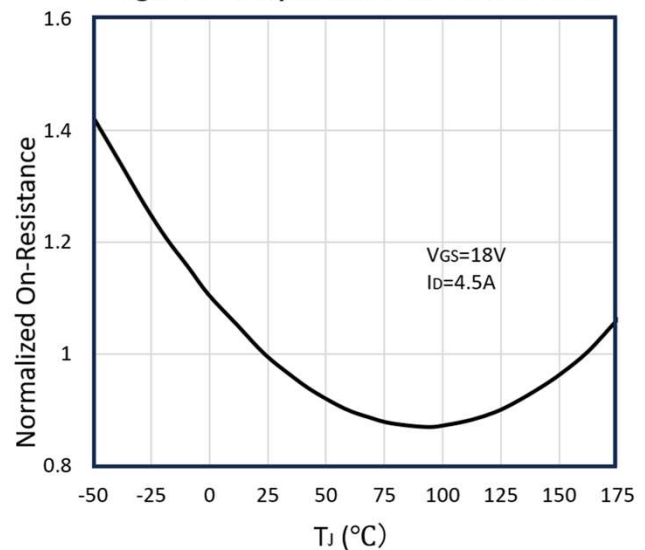


Figure 4: Normalized On-Resistance vs. Junction Temperature

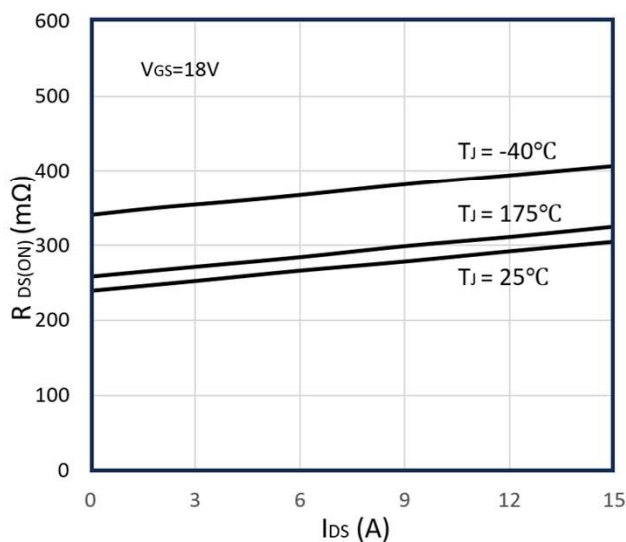


Figure 5: On-Resistance vs. Drain Current For Various Temperatures

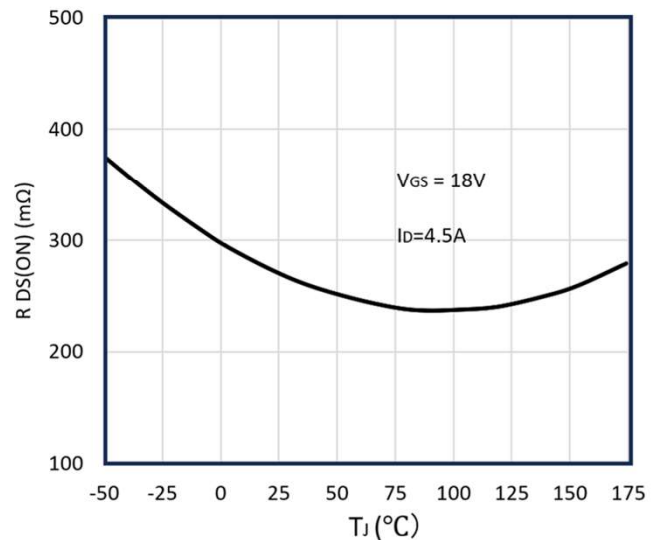


Figure 6: On-Resistance vs. Temperature

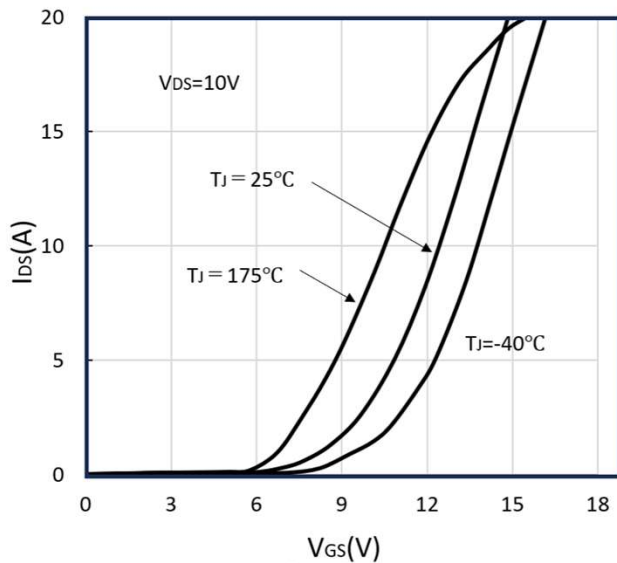


Figure 7: Transfer Characteristics For Various Junction Temperature

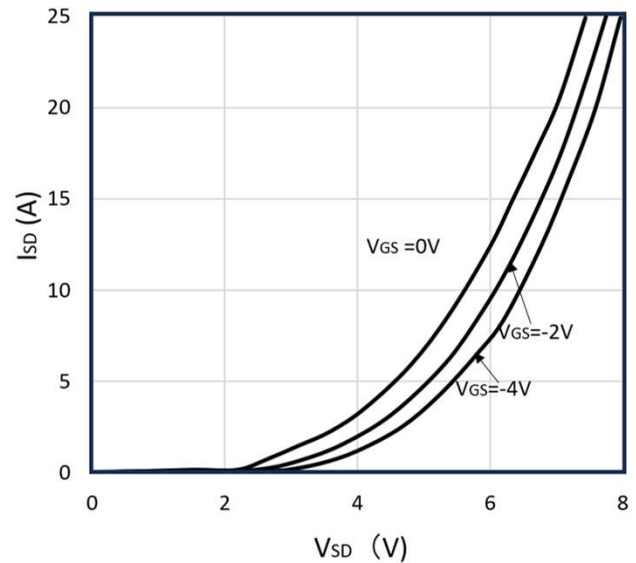


Figure 8: Body Diode Characteristics at $-40^\circ C$

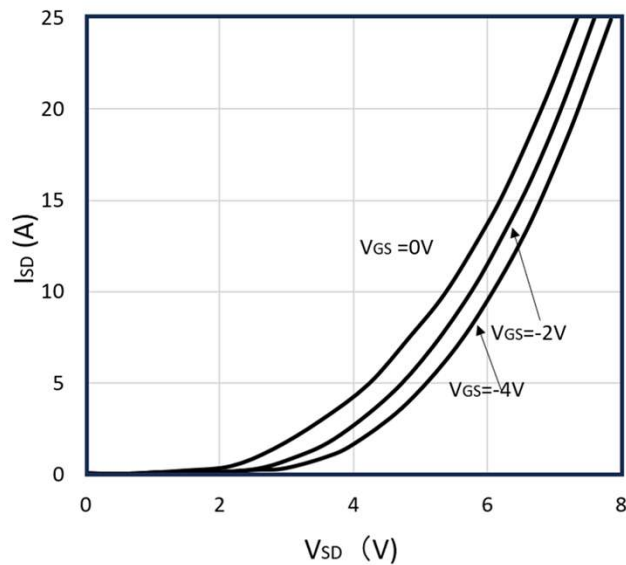


Figure 9: Body Diode Characteristics at $25^\circ C$

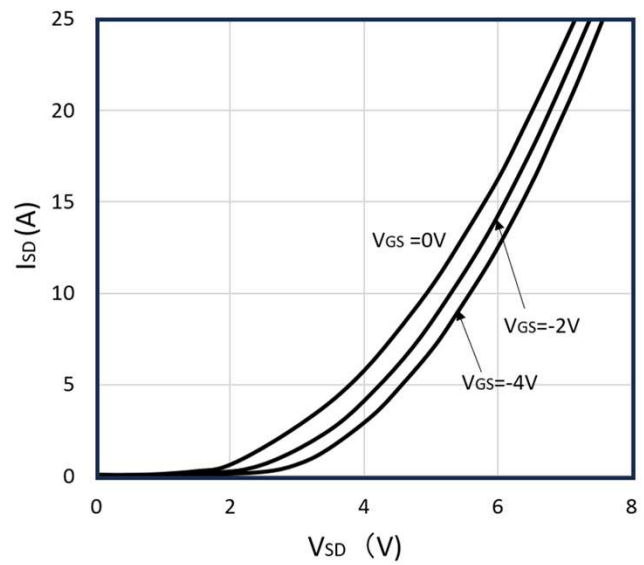


Figure 10: Body Diode Characteristics at $175^\circ C$

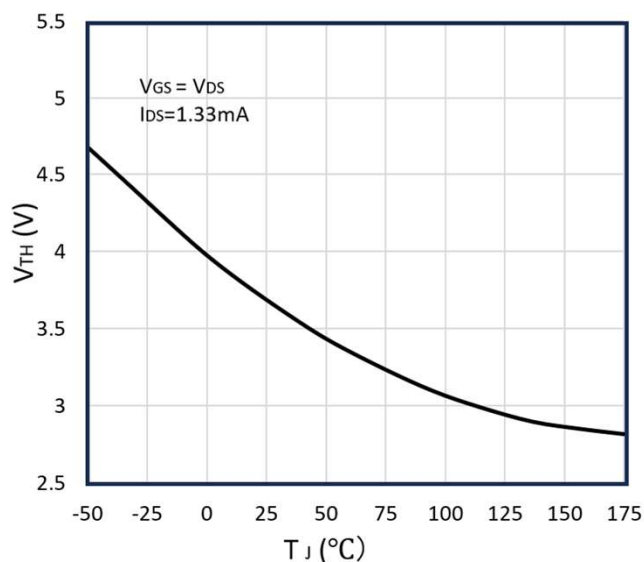


Figure 11: Threshold Voltage vs. Temperature

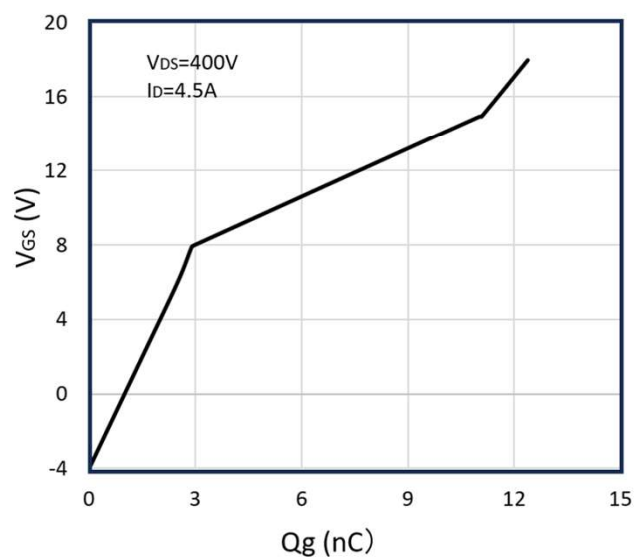


Figure 12: Gate- Charge Characteristics

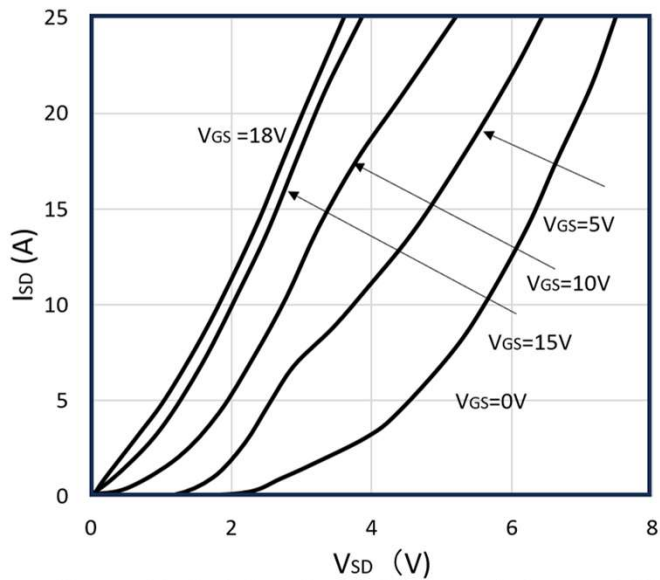


Figure 13: 3rd Quadrant Characteristics at -40°C

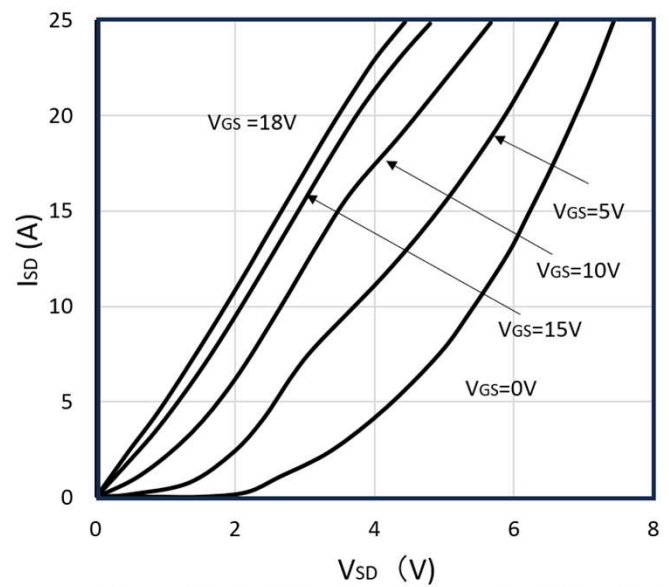


Figure 14: 3rd Quadrant Characteristics at 25°C

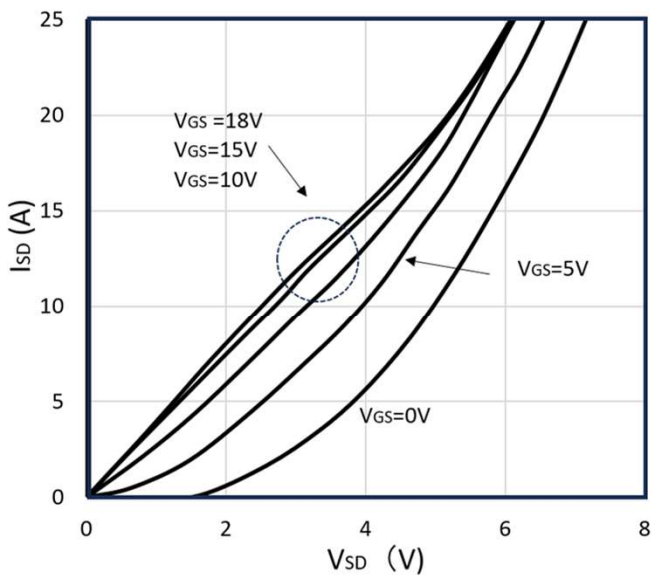


Figure 15: 3rd Quadrant Characteristics at 175°C

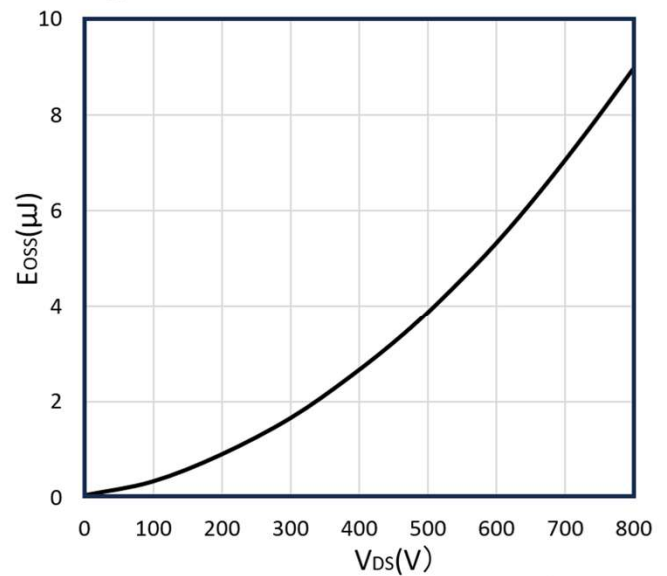


Figure 16: Output Capacitor Stored Energy

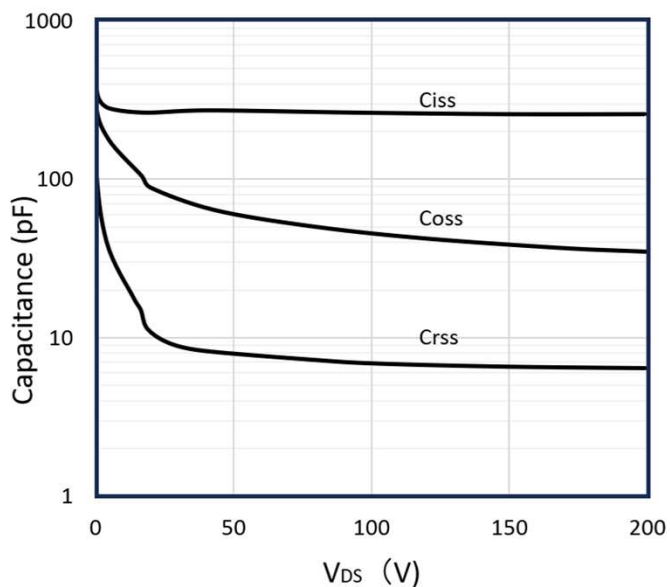


Figure 17: Capacitance Characteristics(0 - 200V)

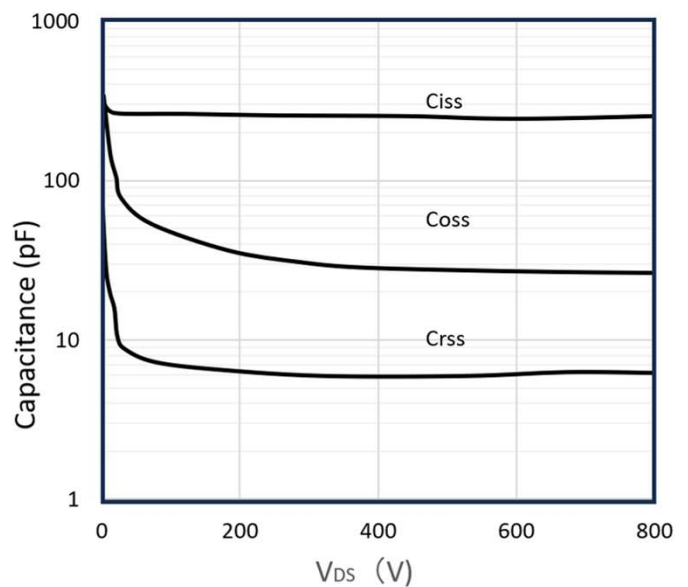


Figure 18: Capacitance Characteristics(0 - 800V)

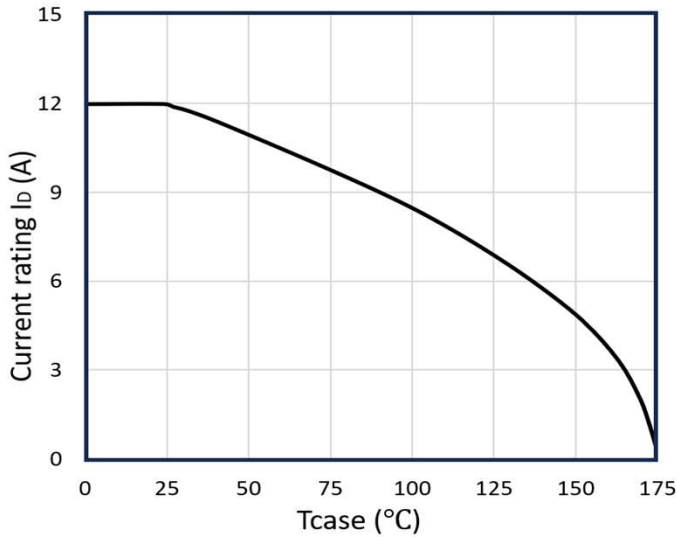


Figure 19: Current De-rating

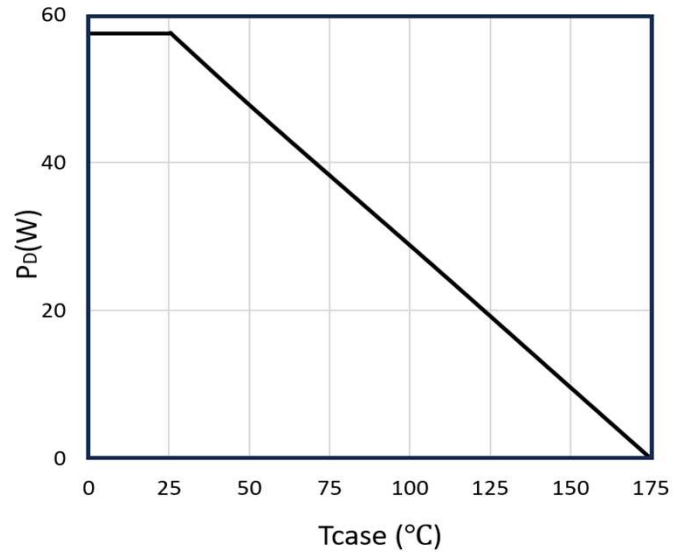


Figure 20: Maximum Power Dissipation Derating vs. Case Temperature

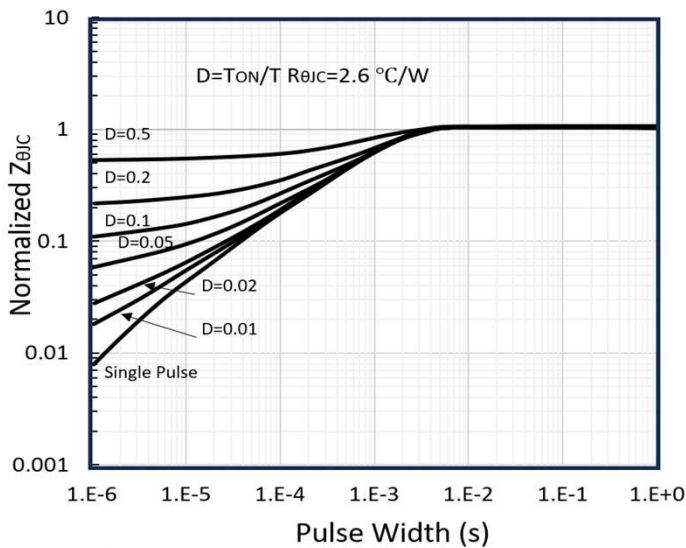


Figure 21: Normalized Maximum Transient Thermal Impedance

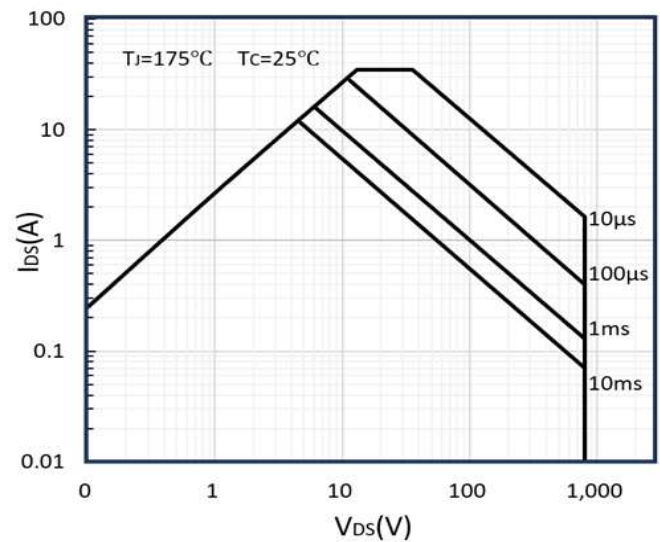


Figure 22: Maximum Forward Biased Safe Operating Area

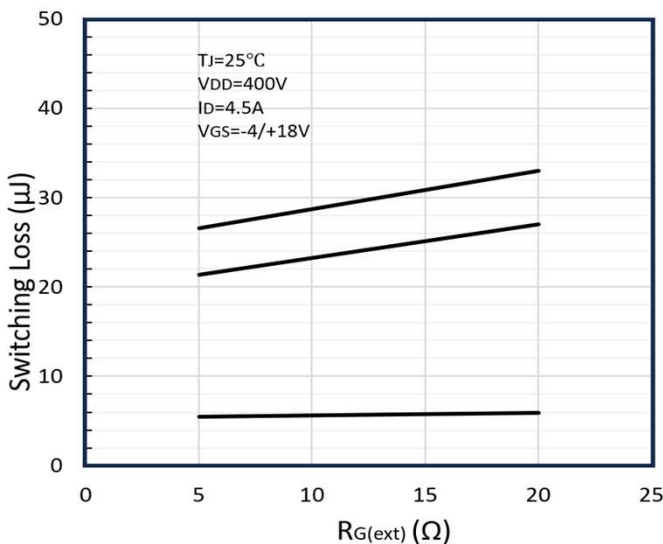


Figure 23: Clamped Inductive Switching Energy vs R_{G(EXT)}

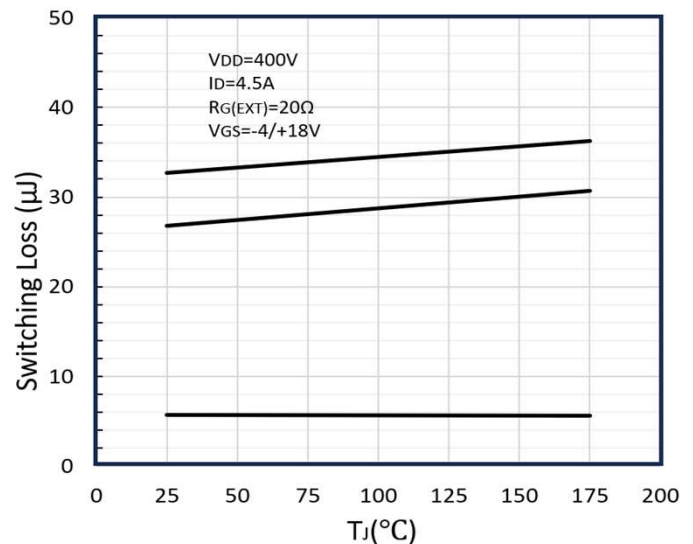


Figure 24: Clamped Inductive Switching Energy vs T_J

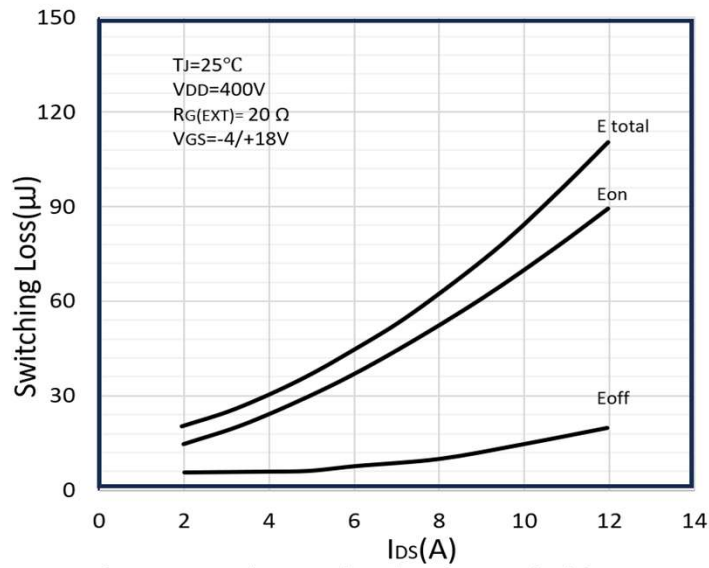


Figure 25: Clamped Inductive Switching Energy vs. Drain Current (VDD=400V)

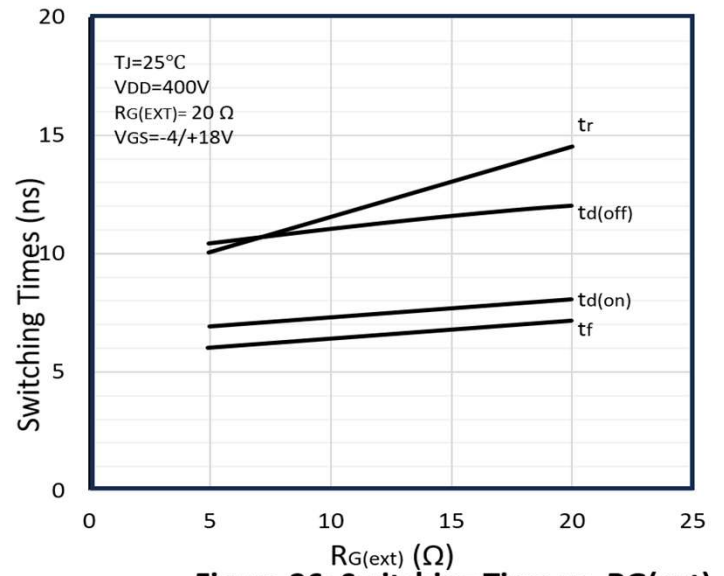
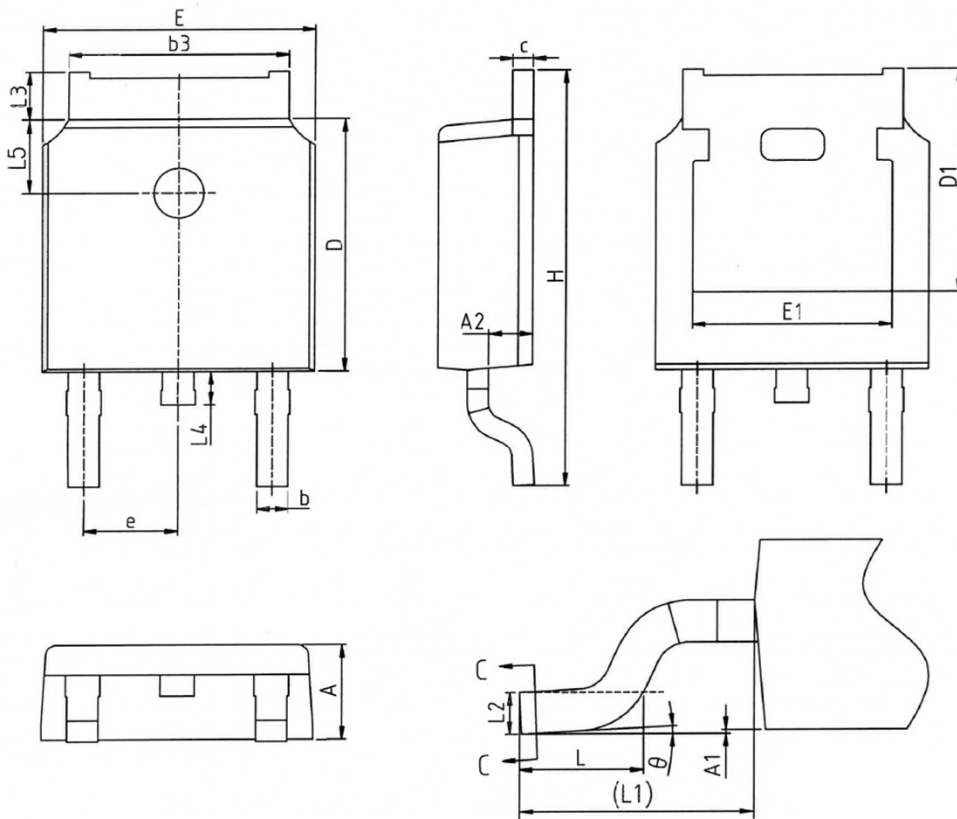


Figure 26: Switching Time vs. $R_{G(EXT)}$

Package Outline: TO252 (DPAK)



COMMON DIMENSIONS

SYMBOL	mm		
	MIN	NOM	MAX
A	2.20	2.30	2.38
A1	0.00	-	0.12
A2	0.97	1.07	1.17
b	0.68	0.78	0.90
b3	5.20	5.33	5.46
c	0.43	0.53	0.61
D	5.98	6.10	6.22
D1	5.30REF		
E	6.40	6.60	6.73
E1	4.63	-	-
e	2.286BSC		
H	9.40	10.10	10.50
L	1.38	1.50	1.75
L1	2.90REF		
L2	0.51BSC		
L3	0.88	-	1.28
L4	0.50	-	1.00
L5	1.65	1.80	1.95
θ	0°	-	8°

NOTES

1. ALL DIMENSIONS REFER TO JEDEC STANDARD TO-252 AA, DO NOT INCLUDE MOLD FLASH OR PROTRUSIONS.

Marking Information

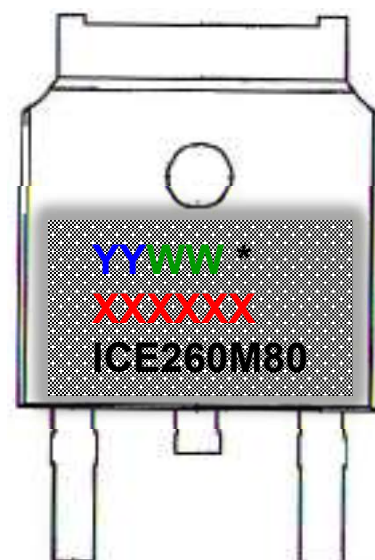
YY = Last two digits of the year

WW = Work week

***** = Site ID

XXXXXX = Lot ID

ICE260M80 = ICE is IceMOS logo and 260M80 is a designated device part number



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