HXYS7N170MP

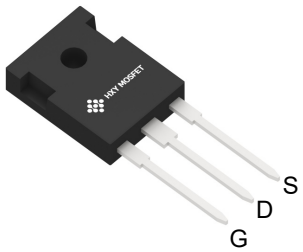
SiC Power MOSFET N-Channel Enhancement Mode

Features

- 3rd generation SiC MOSFET technology
- Optimized package with separate driver source pin
- High blocking voltage with low on-resistance
- High-speed switching with low capacitances
- Fast intrinsic diode with low reverse recovery (Q_{rr})
- Halogen free, RoHS compliant

Benefits

- Reduce switching losses and minimize gate ringing
- Higher system efficiency
- Reduce cooling requirements
- Increase power density
- Increase system switching frequency



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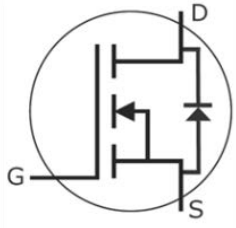
Applications

- Renewable energy
- EV battery chargers
- High voltage DC/DC converters
- Switch Mode Power Supplies



Ordering Part Number	Package	Brand
HXYS7N170MP	TO-247	HXY MOSFET

Maximum Ratings (T_C = 25 ˚C unless otherwise specified)

Symbol	Parameter	Value	Unit	Test Conditions	Note
V_{DSmax}	Drain-Source Voltage	1700	V	V_{GS} = 0 V, I_D = 100 A	
V_{GSmax}	Gate-Source Voltage	-10/+25	V	Absolute maximum values	
V_{GSop}	Gate-Source Voltage	-5/+20	V	Recommend operationaled values	
I_D	Continuous Drain Current	7.0	A	V_{GS}=20V, T_c=25°C	Fig. 19
		4.5		V_{GS}=20V, T_c=100°C	
$I_{D(pulse)}$	Pulsed Drain Current	9.0	A	Pulse width t_p limited by T_{Jmax}	Fig. 22
P_D	Power Dissipation	62	W	T_c=25°C, T_J=150˚C	Fig. 20
T_J, T_{STG}	Operating Junction and Storage Temperature	-55 to+150	°C		
T_L	Solder Temperature, 1.6mm from case for 10S	260	°C		
M_d	Mounting Torque, (M3 or 6-32 screw)	18.8	Nmlbf-in		

Electrical Characteristics (T_C=25°C unless otherwise specified)

Symbol	Parameter	Min.	Typ.	Max.	Unit	Test Conditions	Note
$V_{(BR)DSS}$	Train-SourceBreakdown Voltage	1700	/	/	V	V_{SG}=0V, I_D=100μA	
$V_{GS(th)}$	Gate Threshold Voltage	2.0	2.6	4.0	V	V_{DS}=V_{GS}, I_D=1.0mA	Fig. 11
		/	1.8	/		V_{DS}=V_{GS}, I_D=1.0mA, T_J=150°C	
I_{DSS}	Zero Gate Voltage Drain Current	/	1	100	μA	V_{DS}=1700V, V_{GS}=0V	
I_{GSS+}	Gate-Source Leakage Current	/	10	250	nA	V_{DS}=0V, V_{GS}=25V	
I_{GSS-}	Gate-Source Leakage Current	/	10	250	nA	V_{DS}=0V, V_{GS}=-10V	
$R_{DS(on)}$	Drain-Source On-State Resistance	/	650	850	mΩ	V_{GS}=20V, I_D=2A	Fig. 4,5,6
		/	950	/		V_{GS}=20V, I_D=2A, T_J=150°C	
g_{fs}	Transconductance	/	1.06	/	S	V_{DS}=20V, I_D=2A	Fig. 7
		/	1.14	/		V_{DS}=20V, I_D=2A, T_J=150°C	
C_{iss}	Input Capacitance	/	198	/	pF	V_{GS}=0V V_{DS}=1000V f=1MHz	Fig. 17,18
C_{oss}	Output Capacitance	/	13	/			
C_{rss}	Reverse Transfer Capacitance	/	2.1	/			
E_{oss}	C_{oss} Stored Energy	/	6.6	/	μJ	V_{AC}=25mV	Fig. 16
E_{ON}	Turn-On Switching Energy	/	5	/	mJ	V_{DS}=1200V, V_{GS}=-5V/20V	
E_{OFF}	Turn-Off Switching Energy	/	9.2	/		I_D=2A, $R_{G(ext)}$=2.5Ω,	
$t_{d(on)}$	Turn-On Delay Time	/	13.8	/	ns	L=1500μH	
t_r	Rise Time	/	22.8	/		V_{DS}=1200V,	
$t_{d(off)}$	Turn-Off Delay Time	/	38	/		V_{GS}=-5V/20V	
t_f	Fall Time	/	14	/		I_D=2A,$R_{G(ext)}$=2.5Ω,R_L=20Ω	
$R_{G(int)}$	Internal Gate Resistance	/	18	/	Ω	f=1MHz, V_{AC}=25mV	
Q_{GS}	Gate to Source Charge	/	5.4	/	nC	V_{DS}=1200V	Fig. 12
Q_{GD}	Gate to Drain Charge	/	7.6	/		V_{GS}=-5V/20V	
Q_G	Total Gate Charge	/	23	/		I_D=2A	

Reverse Diode Characteristics

Symbol	Parameter	Typ.	Max.	Unit	Test Conditions	Note
V_{SD}	Diode Forward Voltage	4.2	/	V	V_{GS}=-5V, I_{SD}=3.5A	Fig. 8,9,10
		3.9	/		V_{GS}=-5V, I_{SD}=3.5A, T_J=150°C	
I_S	Continuous Diode Forward Current	/	7.0	A	T_C=25°C	
t_{rr}	Reverse Recover Time	25	/	ns	V_R=1200V, I_{SD}=2A	
Q_{rr}	Reverse Recovery Charge	15	/	nC		
I_{rrm}	Peak Reverse Recovery Current	2.8	/	A		

Thermal Characteristics

Symbol	Parameter	Typ.	Max.	Unit	Test Conditions	Note
$R_{θJC}$	Thermal Resistance from Junction to Case	1.8	/	°C/W		
$R_{θJA}$	Thermal Resistance from Junction to Ambient	/	40			

Typical Performance

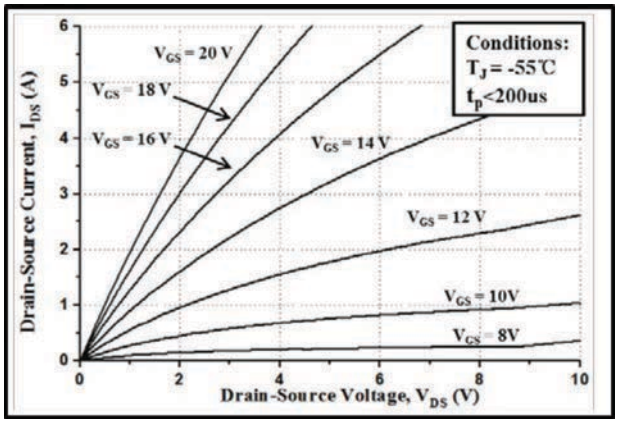


Figure 1. Output Characteristics T_J= -55°C

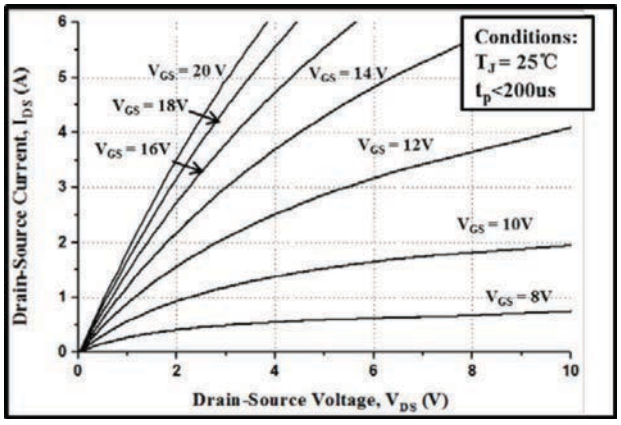


Figure 2. Output Characteristics T_J= 25°C

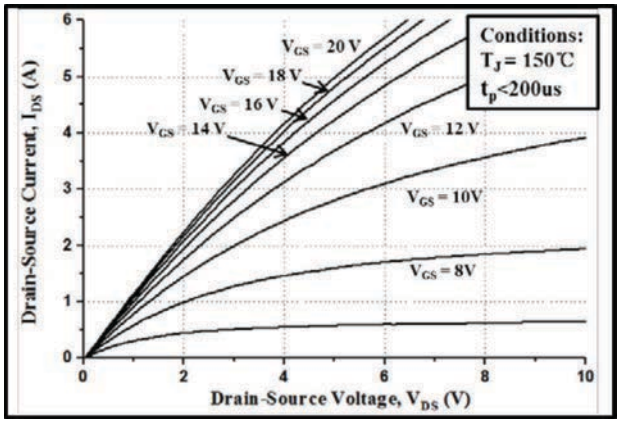


Figure 3. Output Characteristics T_J=150°C

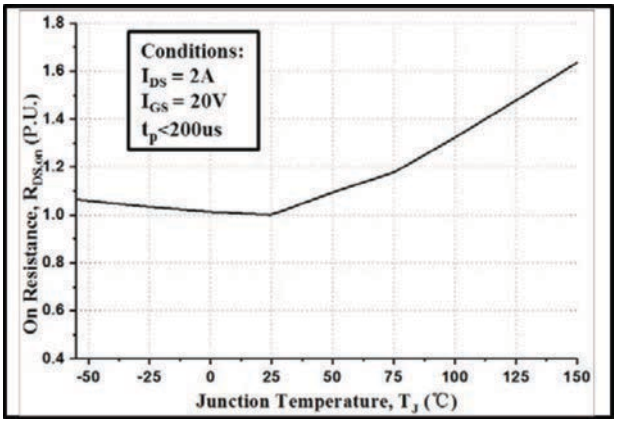


Figure 4. Normalized On-Resistance vs. Temperature

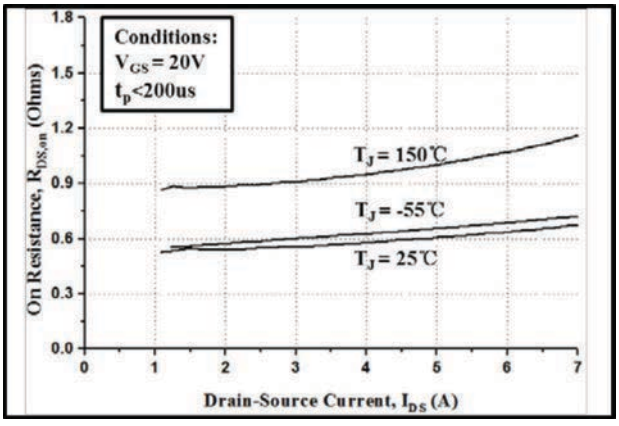


Figure 5. On-Resistance vs. Drain Current For Various Temperatures

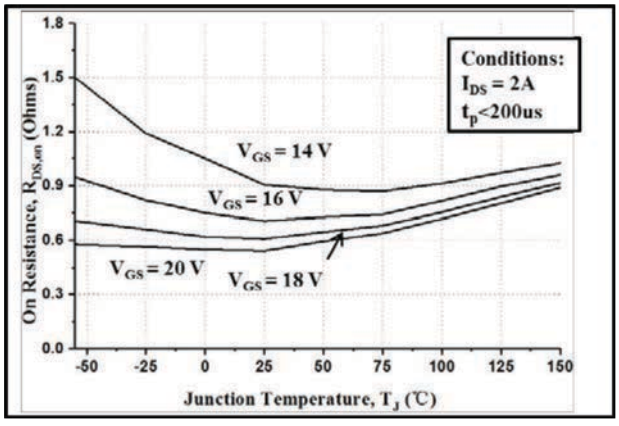


Figure 6. On-Resistance vs. Temperature For Various Gate Voltage

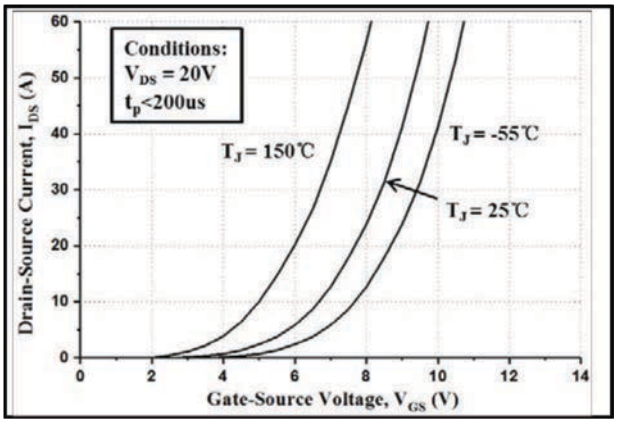


Figure 7. Transfer Characteristic for Various Junction Temperatures

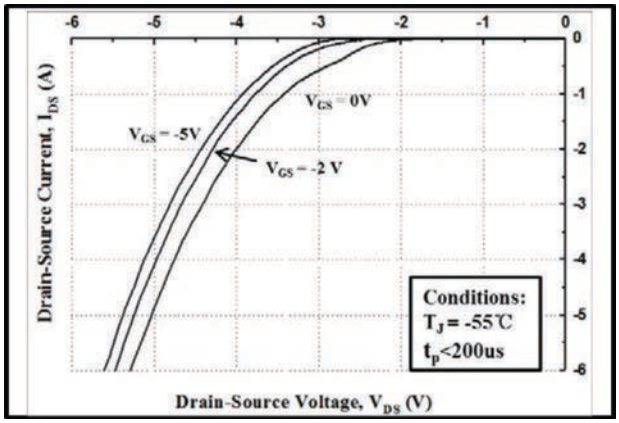


Figure 8. Body Diode Characteristic at -55°C

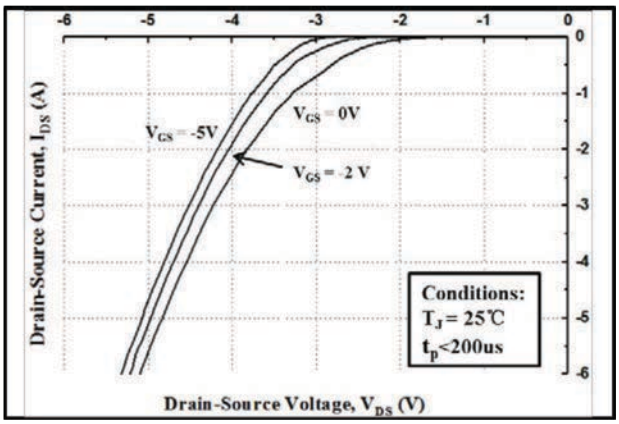


Figure 9. Body Diode Characteristics at 25°C

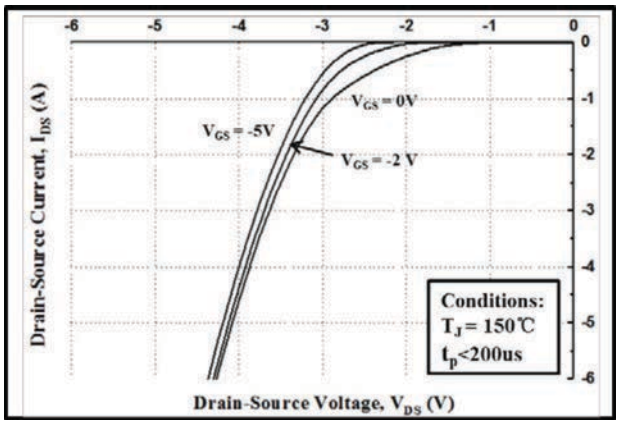


Figure 10. Body Diode Characteristics at 150°C

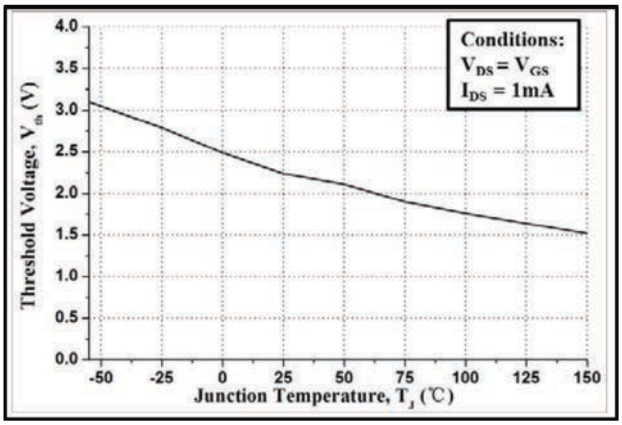


Figure 11. Threshold Voltage vs. Temperature

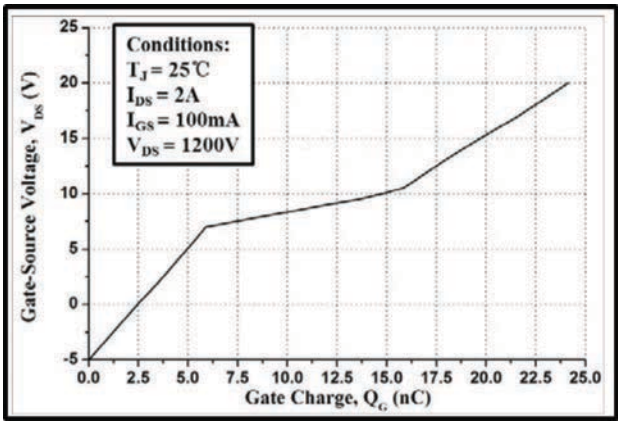


Figure 12. Gate Charge Characteristic

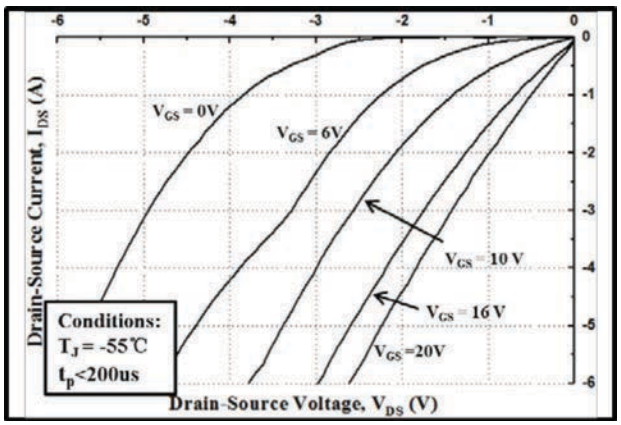


Figure 13. 3rd Quadrant Characteristics at -55°C

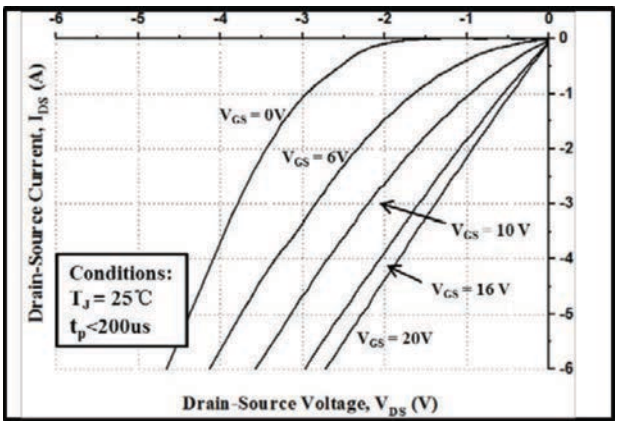


Figure 14. 3rd Quadrant Characteristics at 25°C

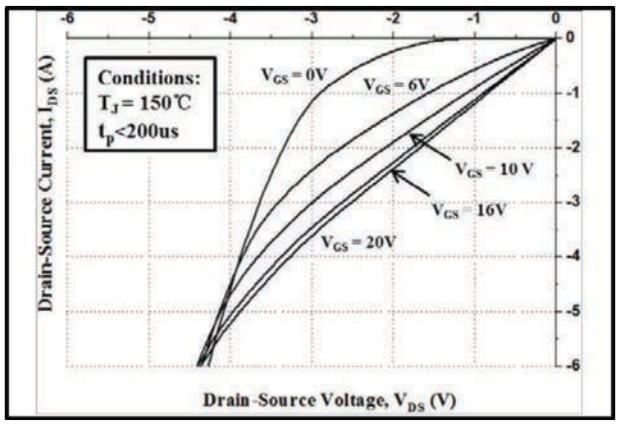


Figure 15. 3rd Quadrant Characteristics at 150°C

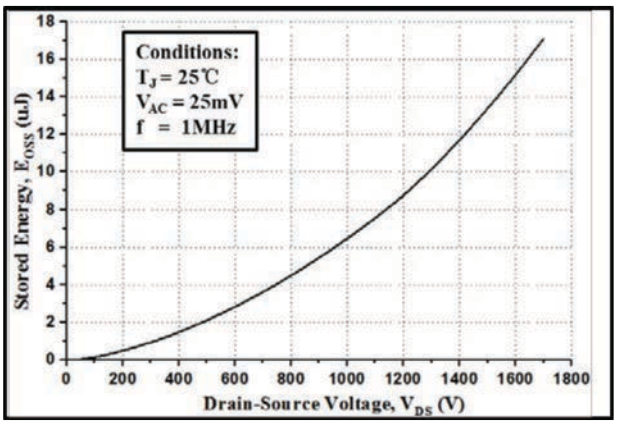


Figure 16. Output Capacitor Stored Energy

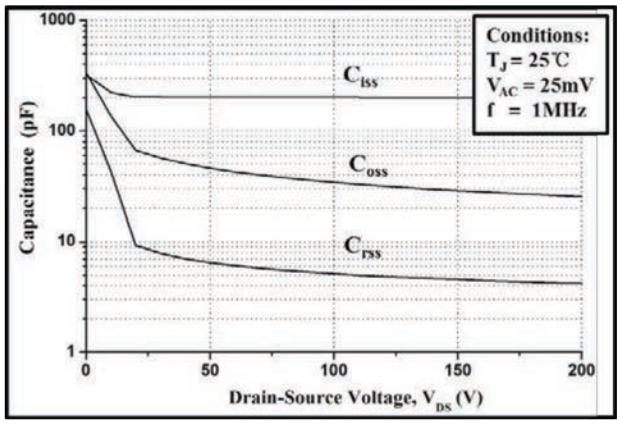


Figure 17. Capactances vs. Drain-Source Voltage (0 - 200V)

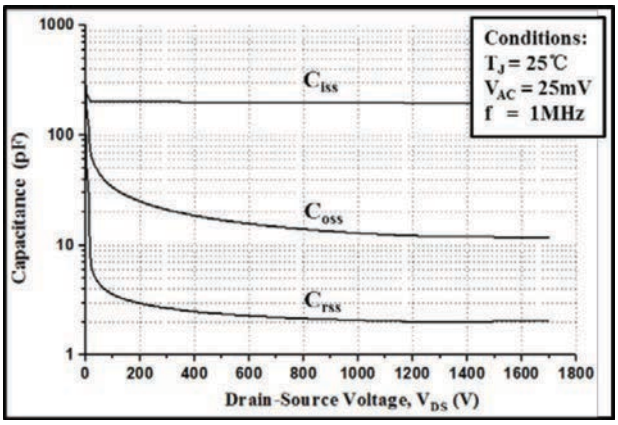


Figure 18. Capactances vs. Drain-Source Voltage (0 - 1700V)

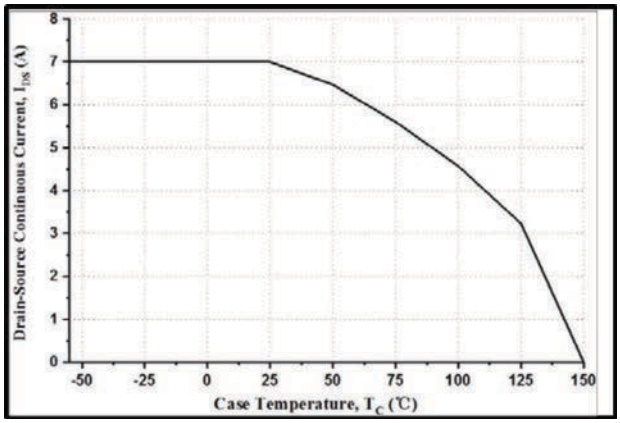


Figure 19. Continuous Drain Current Derating vs. Case Temperature

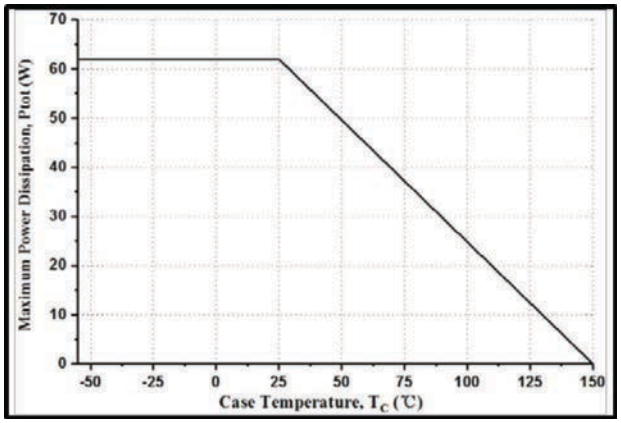


Figure 20. Maximum Power Dissipation Derating vs. Case Temperature

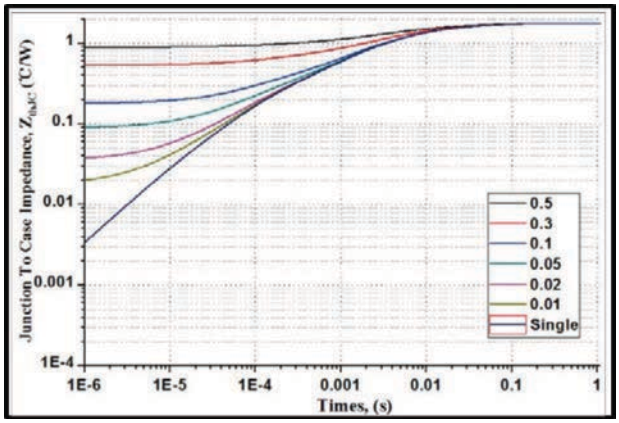


Figure 21. Transient Thermal Impedance (Junction - Case)

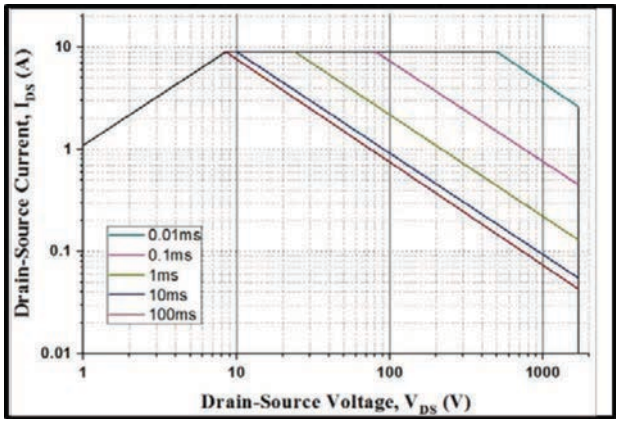


Figure22. Safe Operating Area

Package Dimensions

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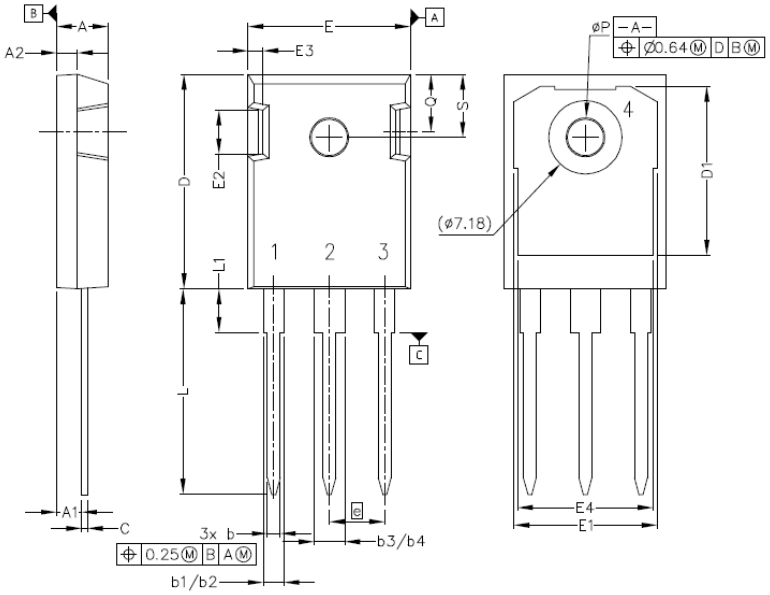
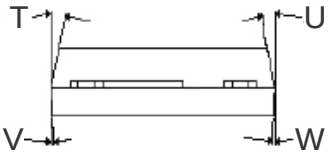


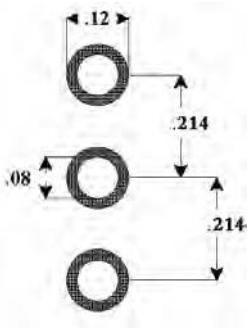


Pinout Information:

- Pin 1 = Gate
- Pin 2, 4 = Drain
- Pin 3 = Source

POS	Inches		Millimeters	
	Min	Max	Min	Max
A	.190	.205	4.83	5.21
A1	.090	.100	2.29	2.54
A2	.075	.085	1.91	2.16
b	.042	.052	1.07	1.33
b1	.075	.095	1.91	2.41
b2	.075	.085	1.91	2.16
b3	.113	.133	2.87	3.38
b4	.113	.123	2.87	3.13
c	.022	.027	0.55	0.68
D	.819	.831	20.80	21.10
D1	.640	.695	16.25	17.65
D2	.037	.049	0.95	1.25
E	.620	.635	15.75	16.13
E1	.516	.557	13.10	14.15
E2	.145	.201	3.68	5.10
E3	.039	.075	1.00	1.90
E4	.487	.529	12.38	13.43
e	.214 BSC		5.44 BSC	
N	3		3	
L	.780	.800	19.81	20.32
L1	.161	.173	4.10	4.40
ØP	.138	.144	3.51	3.65
Q	.216	.236	5.49	6.00
S	.238	.248	6.04	6.30
T	9°	11°	9°	11°
U	9°	11°	9°	11°
V	2°	8°	2°	8°
W	2°	8°	2°	8°

Recommended Solder Pad Layout



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