

HSCM040120L

N-Channel Silicon Carbide Power MOSFET

VDS	R _{DS(ON)} (Typ)	ID
1200V	40mΩ	65A

Features:

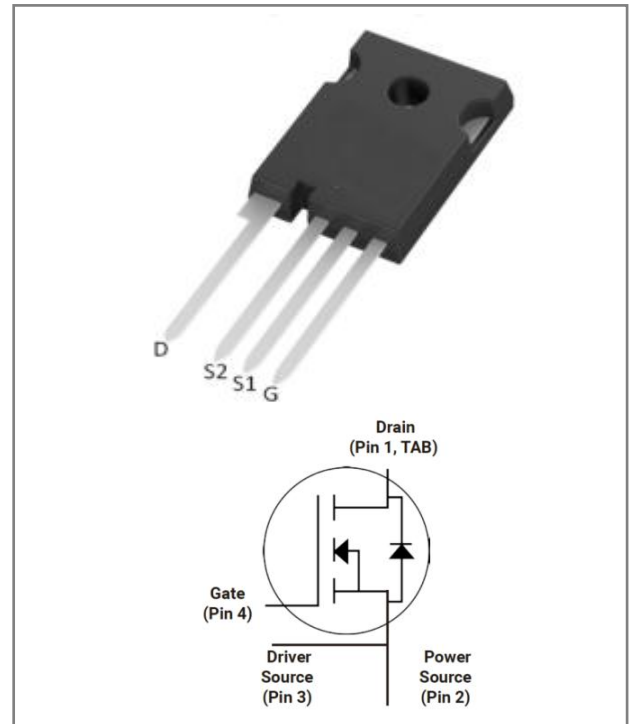
- High Blocking Voltage with Low On-Resistance
- High Speed Switching with Low Capacitances
- Easy to Parallel and Simple to Drive
- Avalanche Ruggedness
- Lead Free

Applications:

- Solar Inverters
- Switch Mode Power Supplies
- High Voltage DC/DC Converters
- EV Charging
- Motor Drives

Benefits:

- Higher System Efficiency
- Reduced Cooling Requirements
- Increased Power Density
- Increased System Switching Frequency



Ordering Information

Part Number	Package	Marking	Packing	Qty.
HSCM040120L	TO-247-4	HSCM040120L	Tube	30 PCS

Maximum Ratings (T_J= 25°C unless otherwise specified)

Symbol	Parameter	Value	Unit	Test Conditions	Note
VDSmax	Drain - Source Voltage	1200	V	VGS=0V, ID =100μA	
VGSmax	Gate - Source Voltage	-8/+22	V	Absolute maximum values	
VGSop	Gate - Source Voltage	-4/+18	V	Recommended operational values	
ID	Continuous Drain Current	65 43	A	VGS=18V, TC =25°C VGS=18V, TC =100°C	
ID(pulse)	Pulsed Drain Current	100	A	Pulse width tp limited by TJmax	
PD	Power Dissipation	375	W	TC =25°C, TJ =175°C	
TL	Solder Temperature	260	°C		
TJ, Tstg	Operating Junction and Storage Temperature	-55 to +175	°C		

Electrical Characteristics ($T_J = 25^{\circ}\text{C}$ unless otherwise specified)

Symbol	Parameter	Min.	Typ.	Max.	Unit	Test Conditions	Note
V(BR)DS S	Drain-Source Breakdown Voltage	1200			V	VGS=0V, ID =100 μ A	
VGS(th)	Gate Threshold Voltage	1.9	2.6	4.0	V	VGS= VDS, IDS=9.5mA, TC =25 $^{\circ}\text{C}$	
			1.8		V	VGS= VDS, IDS=9.5mA, TC =175 $^{\circ}\text{C}$	
IDSS	Zero Gate Voltage Drain Current		1	100	μ A	VDS= 1200V, VGS=0V	
IGSS	Gate-Source Leakage Current		10	250	nA	VGS=22V, VDS= 0V	
IGSS-	Gate-Source Leakage Current		10	250	nA	VGS=-8V, VDS= 0V	
RDS(on)	Drain-Source on-state Resistance		40	52	m Ω	VGS=18V, ID =33.3A, TC =25 $^{\circ}\text{C}$	
			75			VGS=18V, ID =33.3A, TC =175 $^{\circ}\text{C}$	
Ciss	Input Capacitance		2080		pF	VGS=0V, VDS=1000 V, f=1MHz, VAC=25 mV	
Coss	Output Capacitance		86				
Crss	Reverse Transfer Capacitance		15				
EON	Turn-On Switching Energy		687		μ J	VDS =800V, VGS =-4/18V, ID = 30A, RG(ext) = 2.5 Ω , L= 100 μ H	
EOFF	Turn-Off Energy		418				
td(on)	Turn-On Delay Time		24.5		ns	VDS =800V, VGS =-4/18 V ID = 30A, RG(ext) =2. 5 Ω , RL =20 Ω	
tr	Rise Time		21.5				
td(off)	Turn-Off Delay Time		99				
tf	Fall Time		33				
RG(int)	Internal Gate Resistance		3.8		Ω	f=1 MHz, VAC=25mV	
Qgs	Gate to Source Charge		32.3		nC	VDS=800V, VGS=-4/18V ID =30A	
Qgd	Gate to Drain Charge		18.4				
Qg	Total Gate Charge		120				

Reverse Diode Characteristics (TJ= 25℃ unless otherwise specified)

Symbol	Parameter	Typ.	Max	Unit	Test Conditions	Note
VSD	Diode Forward Voltage	4.2	-	V	VGS=-4V, ISD =16.5 A, TJ = 25℃	
		3.9	-	V	VGS=-4V, ISD=16.5 A, TJ= 175℃	
IS	Continuous Diode Forward Current	-	65	A	VGS=-4V, TC= 25℃	
trr	Reverse Recovery time	29	-	ns	ISD= 30 A, VR = 800V	
Qrr	Reverse Recovery Charge	77		nC		
Irrm	Peak Reverse Recovery Current	5	-	A		

Thermal Characteristics (TJ= 25℃ unless otherwise specified)

Symbol	Parameter	Typ.	Max	Unit	Test Conditions	Note
RθJC	Thermal Resistance from Junction to Case	0.44	-	℃/W		
RθJA	Thermal Resistance From Junction to Ambient	-	40			

Typical Characteristics

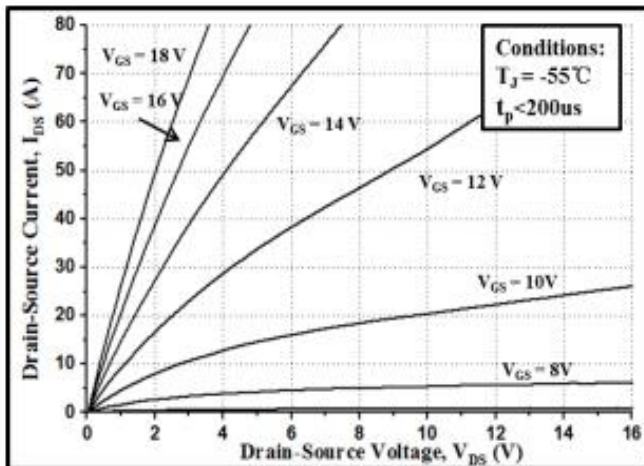


Figure 1. Output Characteristics $T_j = -55^\circ\text{C}$

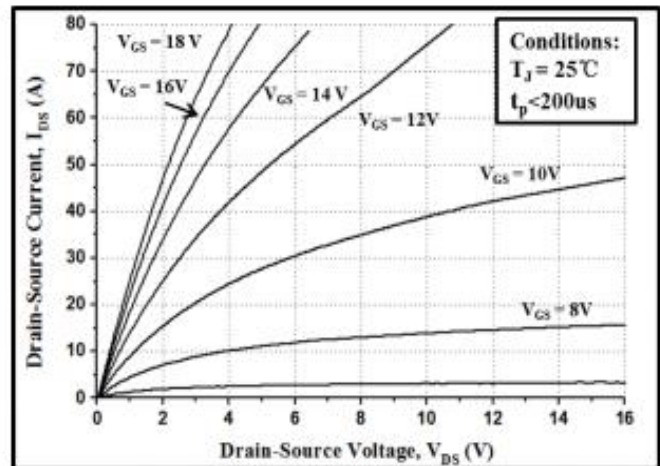


Figure 2. Output Characteristics $T_j = 25^\circ\text{C}$

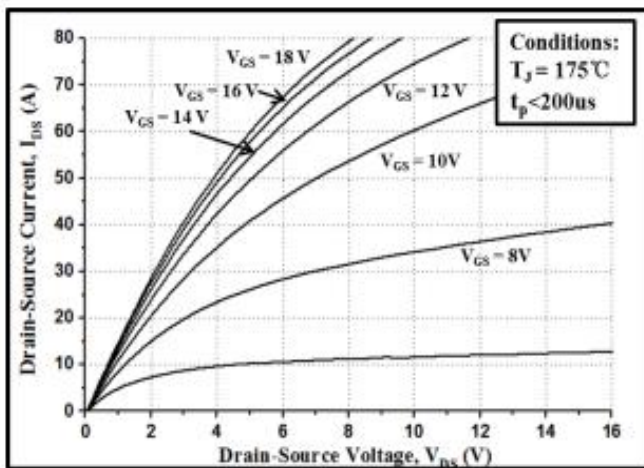


Figure 3. Output Characteristics $T_j = 175^\circ\text{C}$

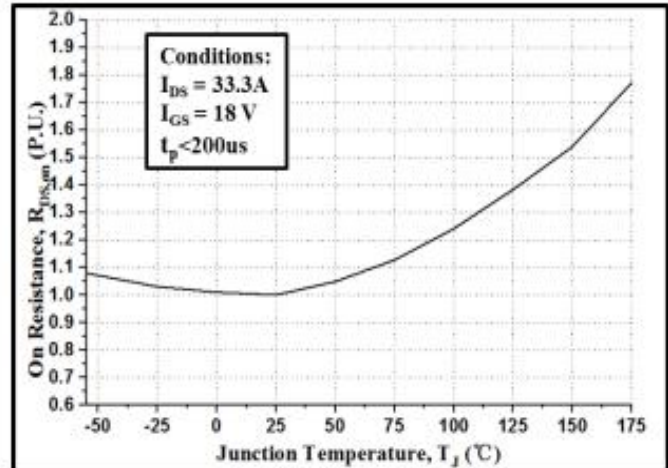


Figure 4. Normalized On-Resistance vs. Temperature

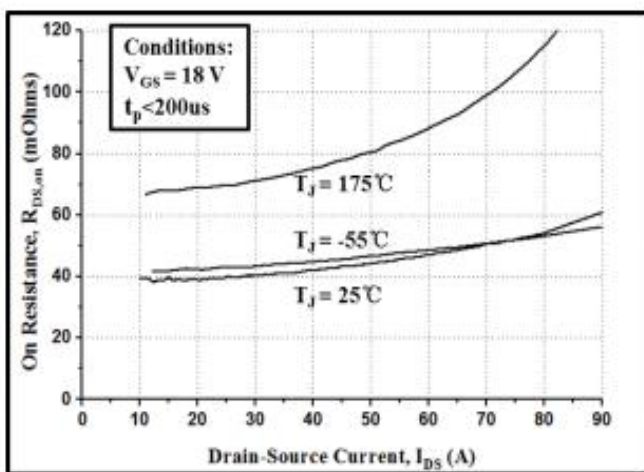


Figure 5. On-Resistance vs. Drain Current
For Various Temperatures

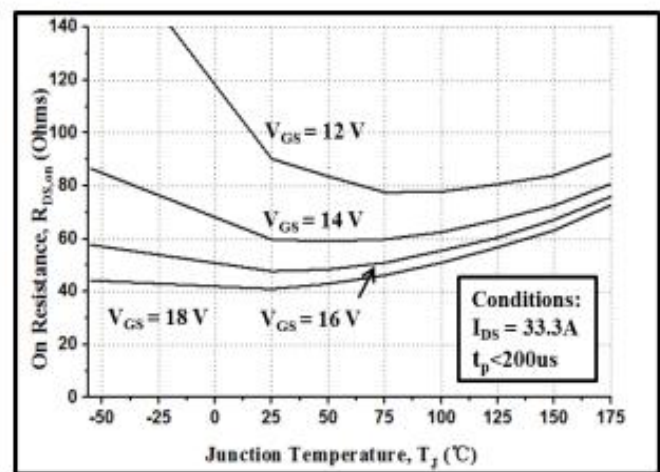


Figure 6. On-Resistance vs. Temperature
For Various Gate Voltage

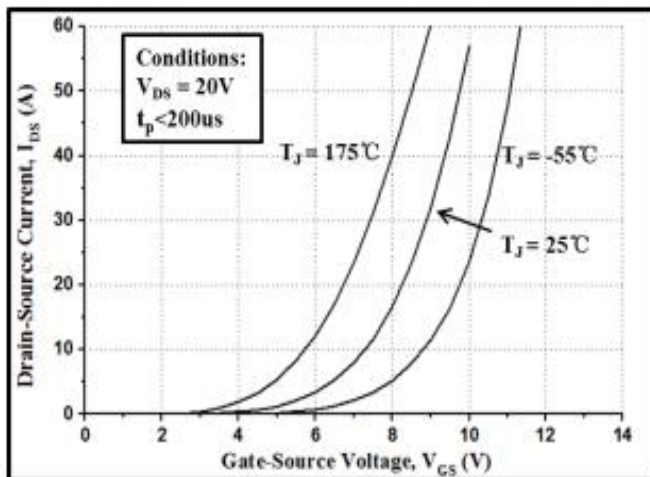


Figure 7. Transfer Characteristic for Various Junction Temperatures

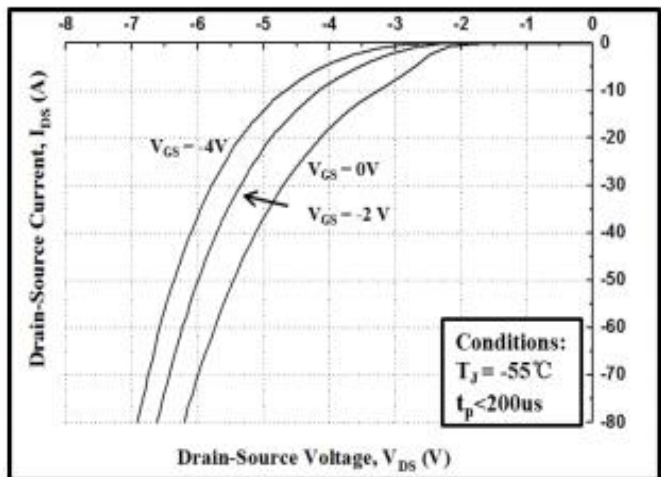


Figure 8. Body Diode Characteristic at -55°C

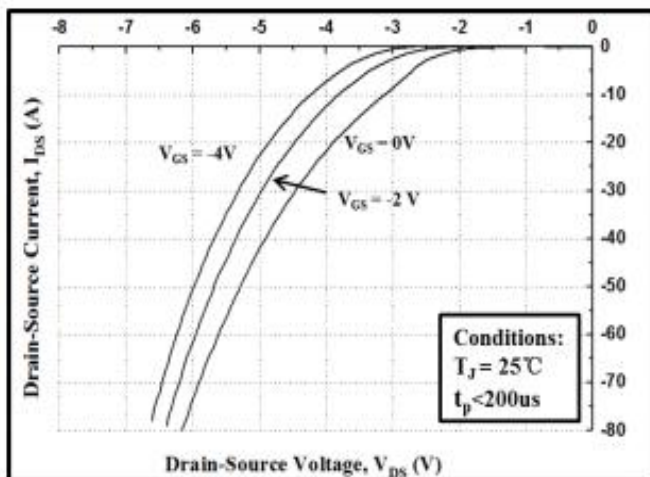


Figure 9. Body Diode Characteristic at 25°C

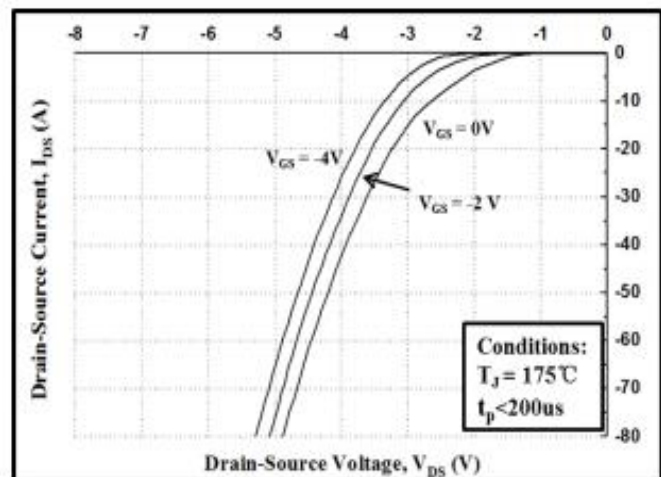


Figure 10. Body Diode Characteristic at 175°C

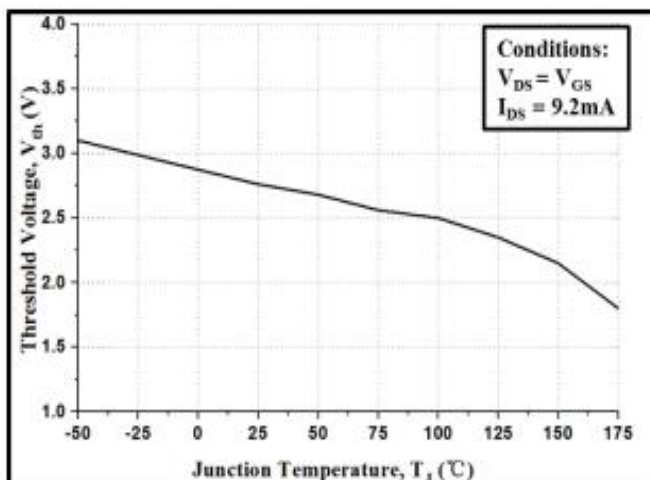


Figure 11. Threshold Voltage vs. Temperature

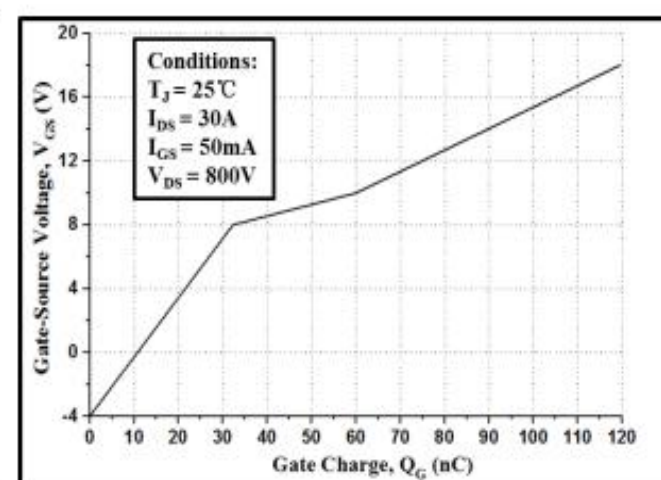


Figure 12. Gate Charge Characteristics

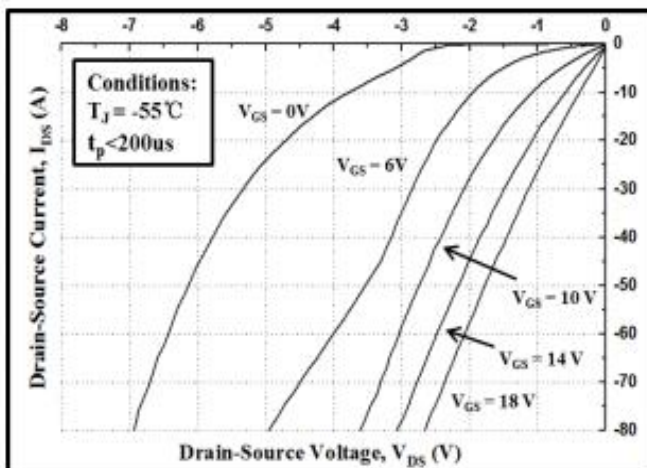


Figure 13. 3rd Quadrant Characteristic at -55°C

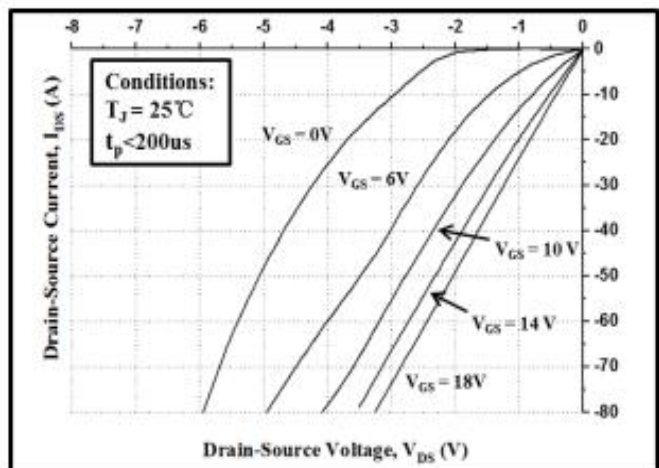


Figure 14. 3rd Quadrant Characteristic at 25°C

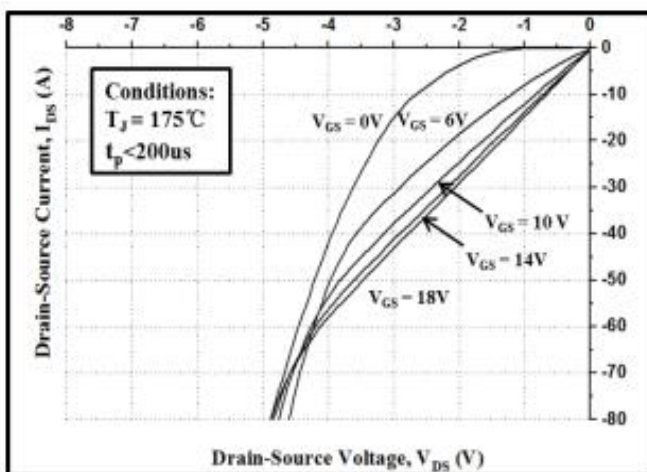


Figure 15. 3rd Quadrant Characteristic at 175 °C

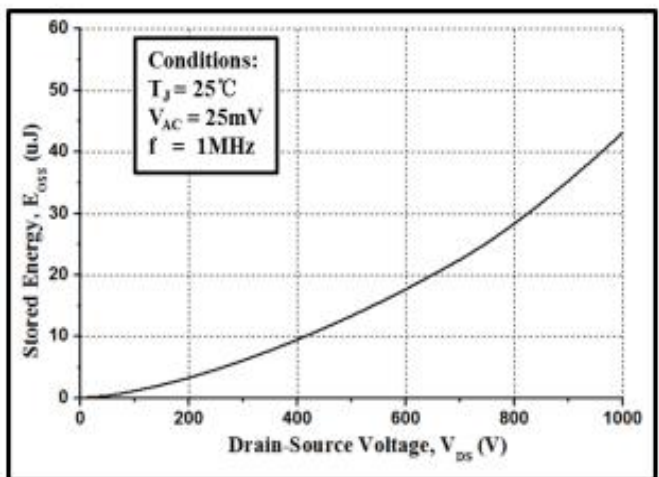


Figure 16. Output Capacitor Stored Energy

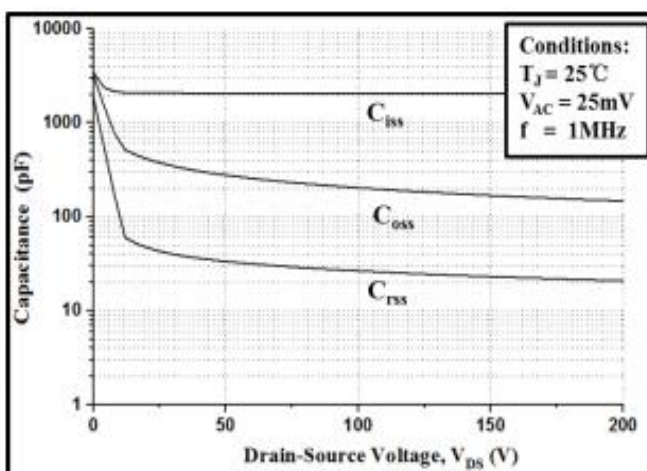


Figure 17. Capacitances vs. Drain-Source Voltage (0 - 200V)

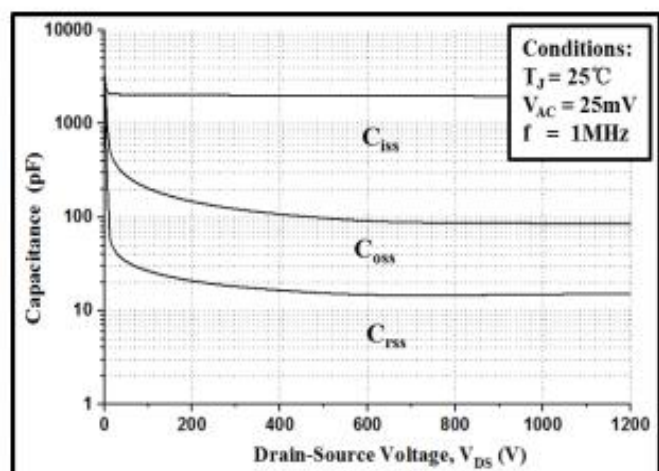


Figure 18. Capacitances vs. Drain-Source Voltage (0 - 1200V)

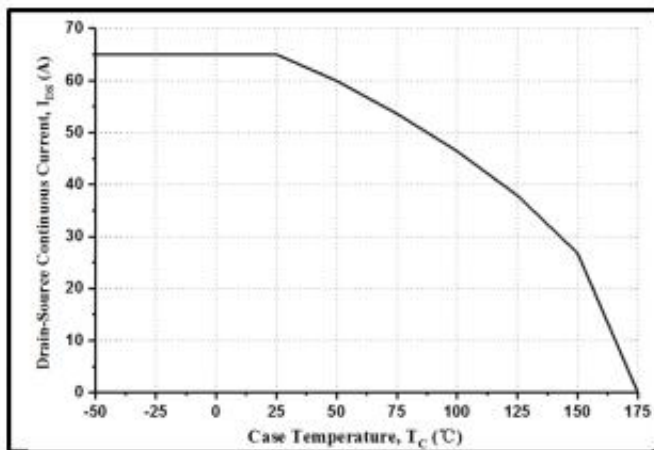


Figure 19. Continuous Drain Current Derating vs. Case Temperature

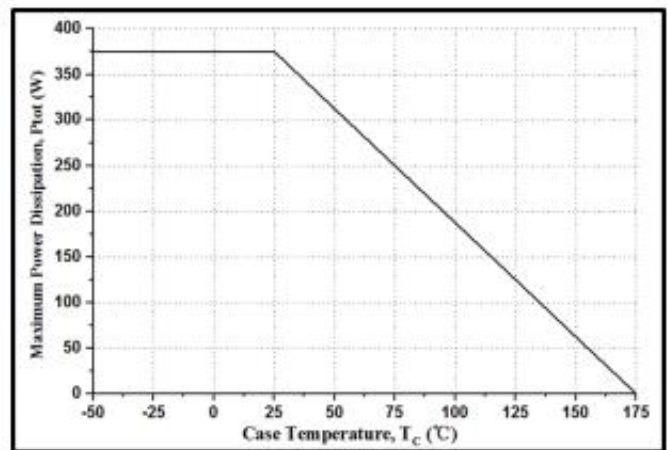


Figure 20. Maximum Power Dissipation Derating vs. Case Temperature

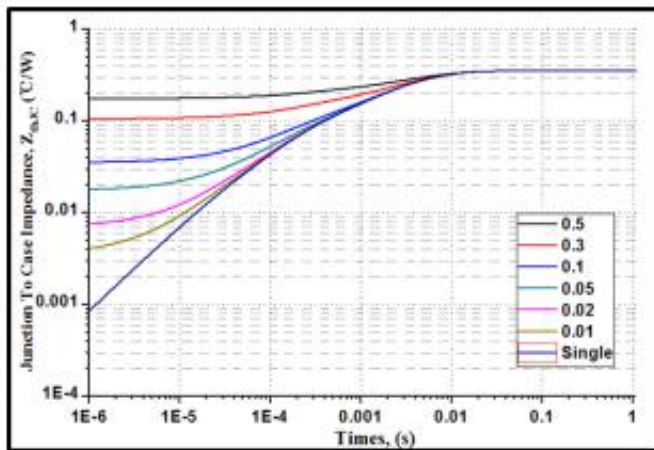


Figure 21. Transient Thermal Impedance (Junction - Case)

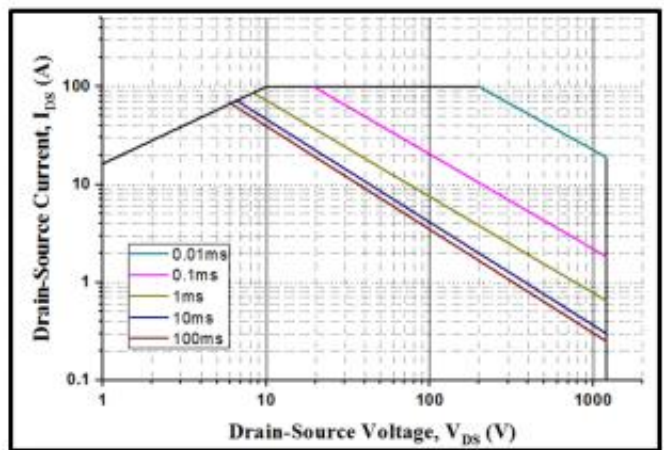
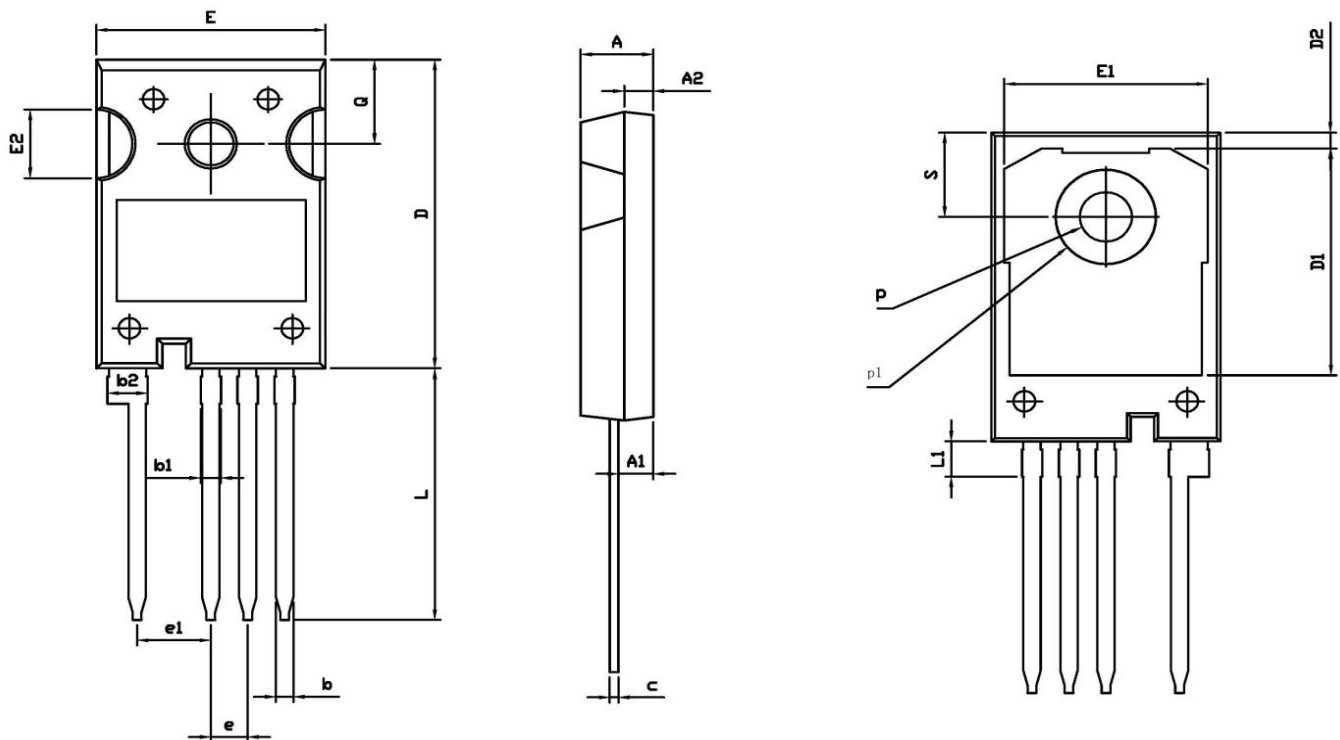
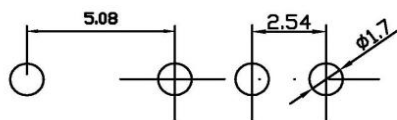


Figure 22. Safe Operating Area

Package outline drawing TO-247-4 Unit: mm)



RECOMMENDED LAND PATTERN



UNIT: mm

	MIN	NOM	MAX
A	4.80	5.00	5.20
A1	2.25	2.40	2.45
A2	1.85	2.00	2.15
b	1.05	1.20	1.35
b1	1.00	1.30	1.60
b2	2.35	2.65	2.95
c	0.50	0.60	0.70
D	22.34	22.54	22.74
D1	16.00	16.50	17.00
D2	0.97	1.17	1.37
e	2.34	2.54	2.74
e1	4.88	5.08	5.28
E	15.60	15.80	16.00
E1	13.50	14.00	14.50
E2	4.80	5.00	5.20
L	18.08	18.38	18.68
L1	2.38	2.58	2.78
p	3.50	3.60	3.70
p1	6.60	6.80	7.00
Q	6.00	6.15	6.30
S	6.00	6.15	6.30