ASHM075120P

N-Channel Silicon Carbide Power MOSFET

Product Summary

$V_{(BR)DSS}$	$R_{DS(on)MAX}$	I_D@25℃
1200V	75mΩ@18V	39A
	90mΩ@15V	

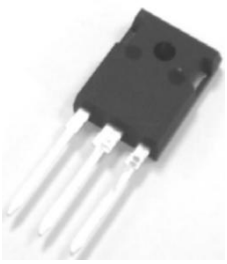
Feature

- Low On-Resistance and High Current Density
- Low Capacitance for High Frequency Operation
- Positive Temperature Coefficient Device
- Low impedance Kelvin source pin-out

Application

- Switching Mode Power Supply
- DC/DC Converters, UPS, and PFC
- Power Inverters
- Auxiliary Power Supplies
- Solar/Wind Renewable Energy

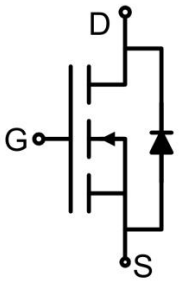
Package



TO-247-3

Marking

Circuit diagram



Absolute maximum ratings (T_C=25℃ unless otherwise noted)

Parameter	Symbol	Test Condition	Value	Unit
Drain-Source Voltage	V_{DSS}	V_{GS} = 0V, I_D =100μA	1200	V
Recommend Gate-Source Voltage	$V_{GS(op)}$	Static, recommended DC operating values	-5/18	V
Maximum Gate-Source Voltage	$V_{GS(max)}$	Transient operating limit (AC,f > 1Hz, duty cycle < 1%)	-10/25	V
Continuous Drain Current	I_D	V_{GS}=18V	39	A
	I_D	V_{GS}=18V,T_C=110℃	27	A
Pulsed Drain Current	I_{DM}		80	A
Power Dissipation	P_D		187	W
Thermal Resistance(Type)	$R_{\theta JC}$	Junction-to-Case	0.8	℃/W
Single Pulse Avalanche Energy	E_{AS}	V_{DD}=100V, I_D=10A,L=25mH	848	mJ
Junction Temperature	T_J		175	℃
Storage Temperature	T_{STG}		-55 ~ +175	℃
Soldering Temperature	T_L		260	℃

Electrical characteristics (T_C=25 °C, unless otherwise noted)

Parameter	Symbol	Test Condition	Min.	Typ.	Max.	Unit
Static Characteristics						
Drain-source breakdown voltage	$V_{(BR)DSS}$	V_{GS} = 0V, I_D =100μA	1200			V
Zero gate voltage drain current	I_{DSS}	V_{DS} =1200V,V_{GS} = 0V			50	μA
		V_{DS} =1200V,V_{GS} = 0V,T_J=175℃			500	μA
Gate-Source leakage current	I_{GSS}	V_{GS} =18V, V_{DS} = 0V			250	nA
Gate threshold voltage	$V_{GS(th)}$	V_{DS} =V_{GS}, I_D =5mA	2.0	2.6	4.0	V
Drain-source on-resistance	$R_{DS(on)}$	V_{GS} =15V, I_D =20A		75	90	mΩ
		V_{GS} =18V, I_D =20A		60	75	
		V_{GS} =18V, I_D =20A,T_J=175℃		100		
Transconductance	g_{FS}	V_{DS} =10V, I_D =20A		10		S
Dynamic characteristics						
Input Capacitance	C_{iss}	V_{DS} =800V,V_{GS} =0V, f =1MHz,V_{AC}=25mV		1326		pF
Output Capacitance	C_{oss}			57		
Reverse Transfer Capacitance	C_{rss}			5.6		
Stored Energy in Output	E_{OSS}			24		μJ
Effective Output Capacitance, Energy Related	$C_{o(er)}$	V_{GS} =0V, V_{DS} =0 to 800V		75		pF
Effective Output Capacitance, Time Related	$C_{o(tr)}$	I_D=const.,V_{GS} =0V, V_{DS} =0 to 800V		112		
Total Gate Charge	Q_g	V_{DS}=800V,V_{GS}=-3V/18V, I_D=20A		81.6		nC
Gate to Drain Charge	Q_{gs}			19.5		
Gate to Drain Charge	Q_{gd}			23.4		
Gate plateau voltage	V_p			6.9		V
Turn-On Delay Time	$t_{d(on)}$	V_{DS} =800V,V_{GS} =-3V/18V, I_D =20A, $R_{G(ext)}$=2.7Ω, L=100μH		23		nS
Rise Time	t_r			15		
Turn-Off Delay Time	$t_{d(off)}$			22		
Fall Time	t_f			11		
Turn-On Energy	E_{on}			405		μJ
Turn-Off Energy	E_{off}			72		
Internal Gate Resistance	$R_{G(int)}$	f =1MHz,V_{AC}=25mV		3.1		Ω
Source-Drain Diode characteristics						
Diode Forward voltage	V_{SD}	V_{GS} =0V, I_{SD}=10A		3.48		V
Diode Forward Current	I_S	T_C=25℃		35		A
Pulse Diode Forward Current	$I_{S,pulse}$	Pulse width t_{PW} limited by T_{jmax}		80		
Reverse Recovery Time	t_{rr}	I_{SD}=20A, V_R =800V,V_{GS}=-3V di/dt = 1150A/μs		43		nS
Reverse Recovery Charge	Q_{rr}			162		nC
Peak Reverse Recovery Current	I_{rrm}			8.3		A

Typical Characteristics

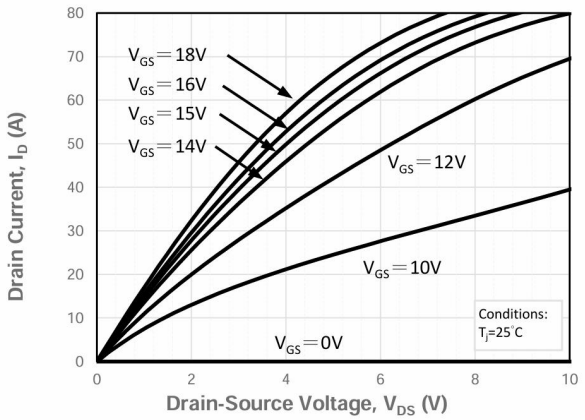


Fig.1 Forward Output Characteristics at T_j=25°C

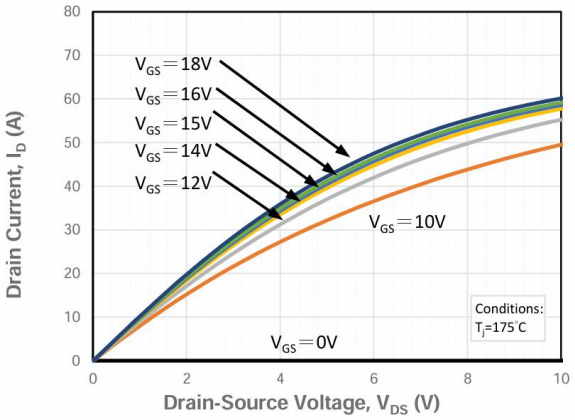


Fig.2 Forward Output Characteristics at T_j=175°C

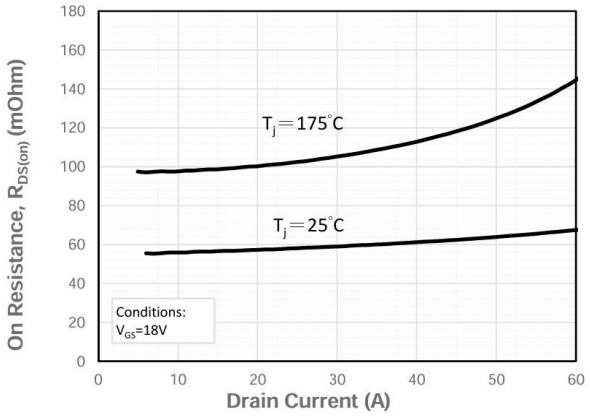


Fig.3 On-Resistance vs. Drain Current for Various T_j

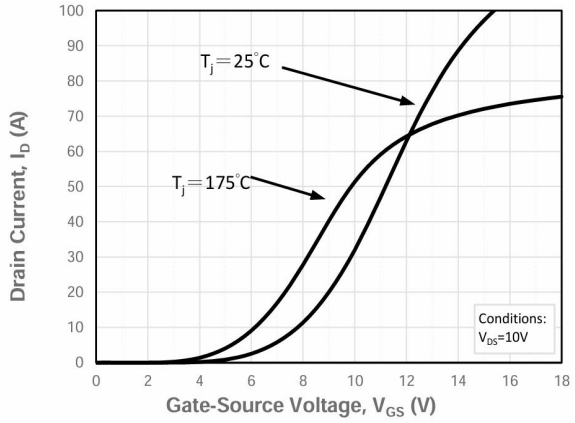


Fig.4 Transfer Characteristics for Various T_j

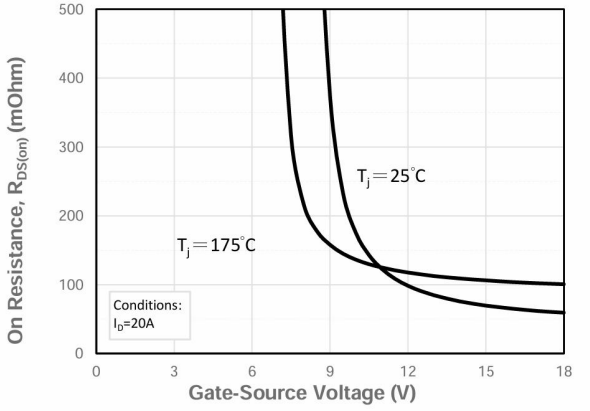


Fig.5 On-Resistance vs. Gate Voltage for Various T_j

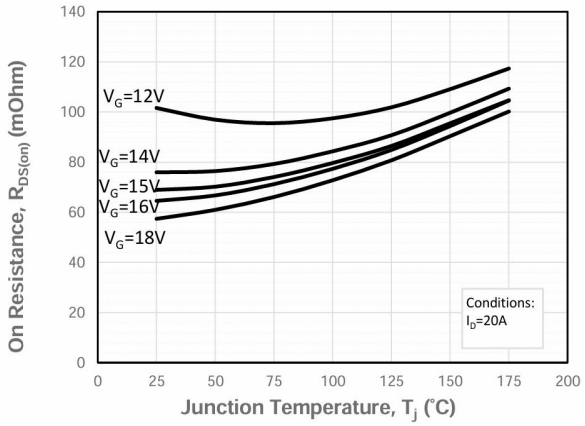


Fig.6 On-Resistance vs. Temperature for Various Gate Voltage

Typical Characteristics

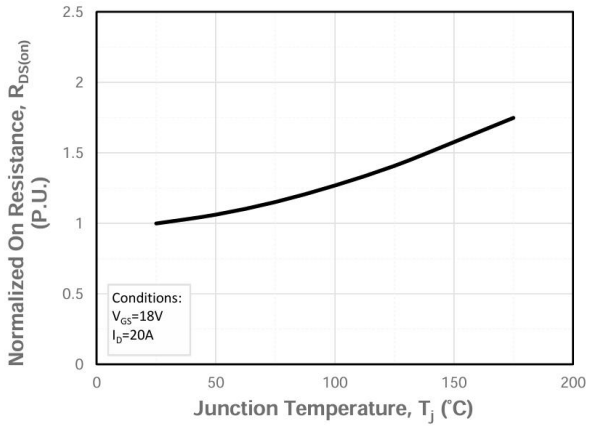


Fig.7 Normalized On-Resistance vs. Temperature

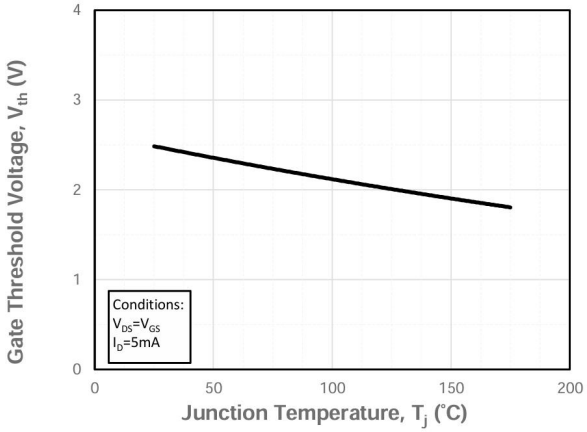


Fig.8 Threshold Voltage vs. Temperature

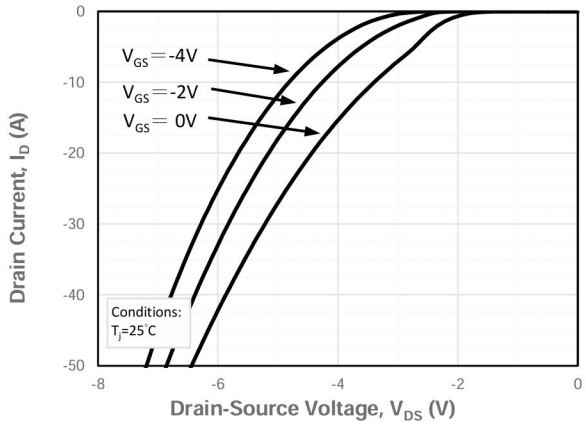


Fig.9 Body Diode Characteristics at Tj = 25°C

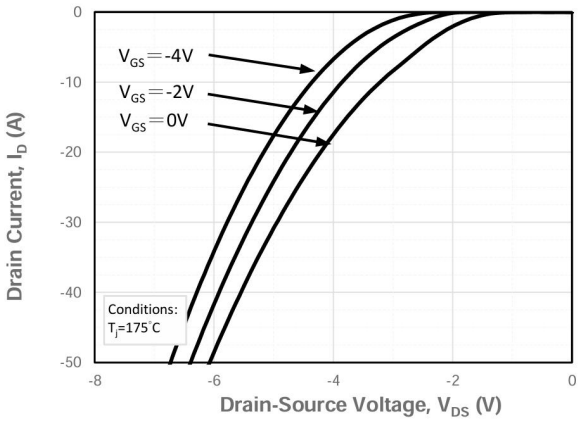


Fig.10 Body Diode Characteristics at T_j = 175°C

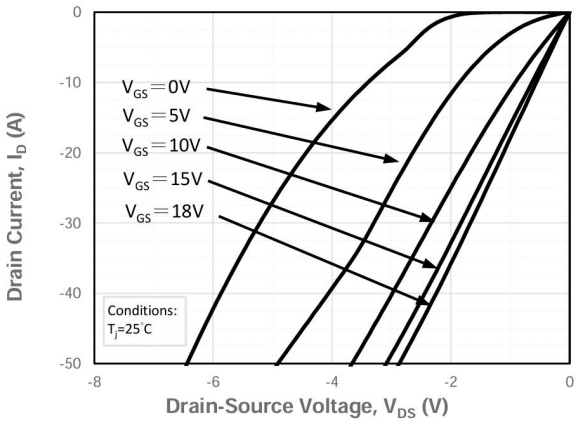


Fig.11 3rd Quadrant Characteristics at Tj = 25°C

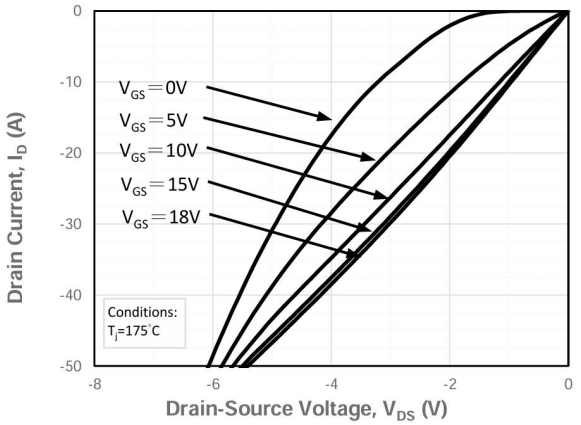


Fig.12 3rd Quadrant Characteristics at Tj = 175°C

Typical Characteristics

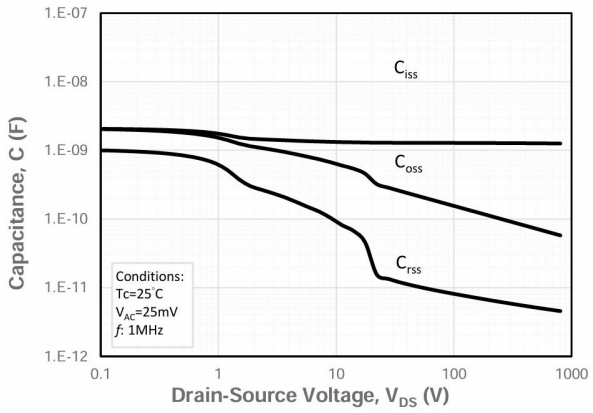


Fig.13 Capacitances vs. Drain to Source Voltage

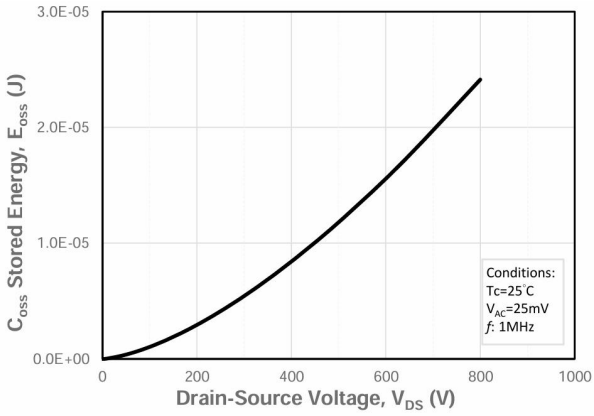


Fig.14 Output Capacitor Stored Energy

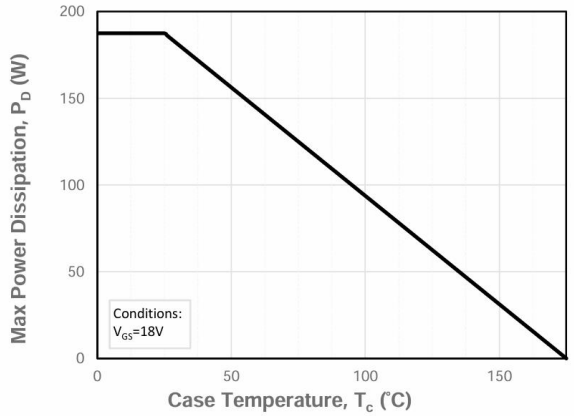


Fig.15 Maximum Power Dissipation Derating vs. Case Temperature

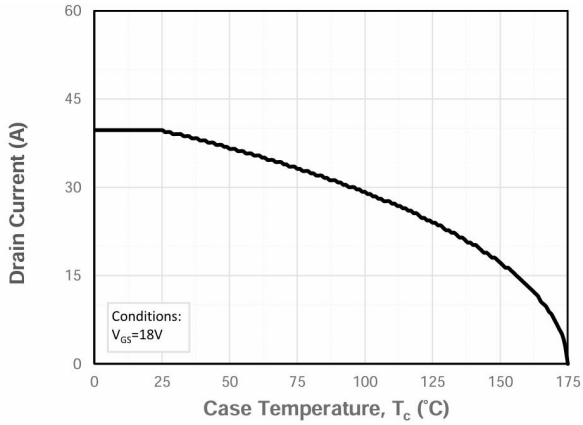


Fig.16 Drain Current Derating vs. Casve Temperature

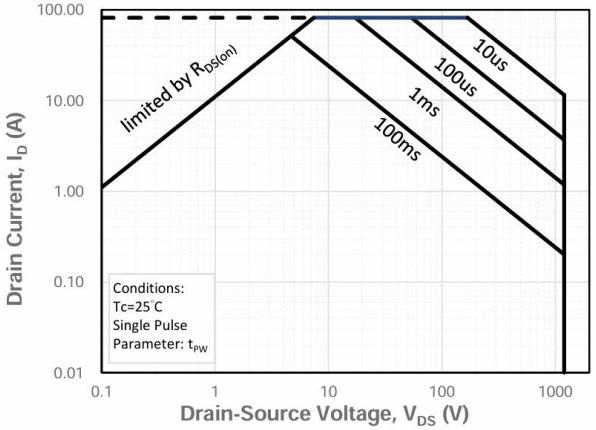


Fig.17 Safe Operating Area

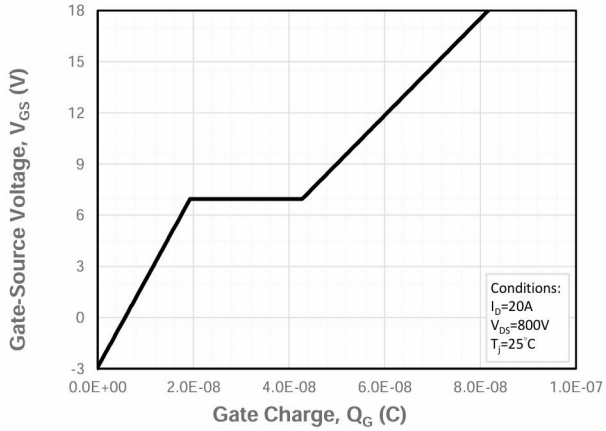


Fig.18 Gate Charge Characteristics

Typical Characteristics

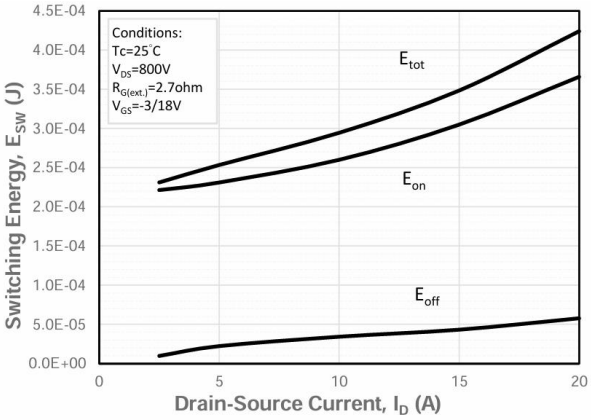


Fig.19 Clamped Inductive Switching Energy vs. Drain Current

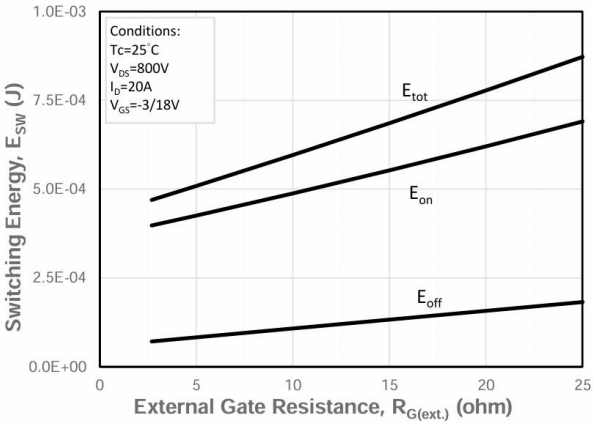


Fig.20 Clamped Inductive Switching Energy vs. External Gate Resistor (RG(ext.))

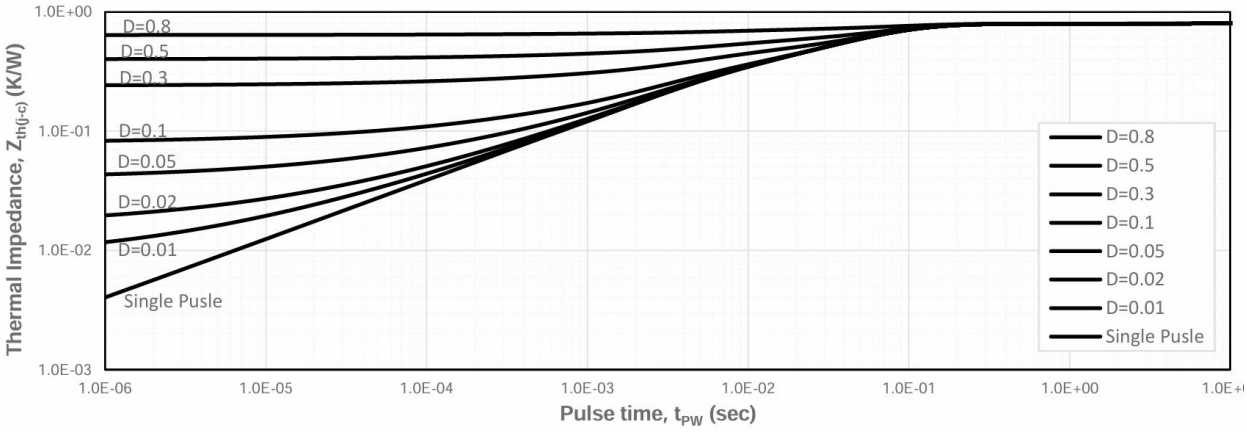
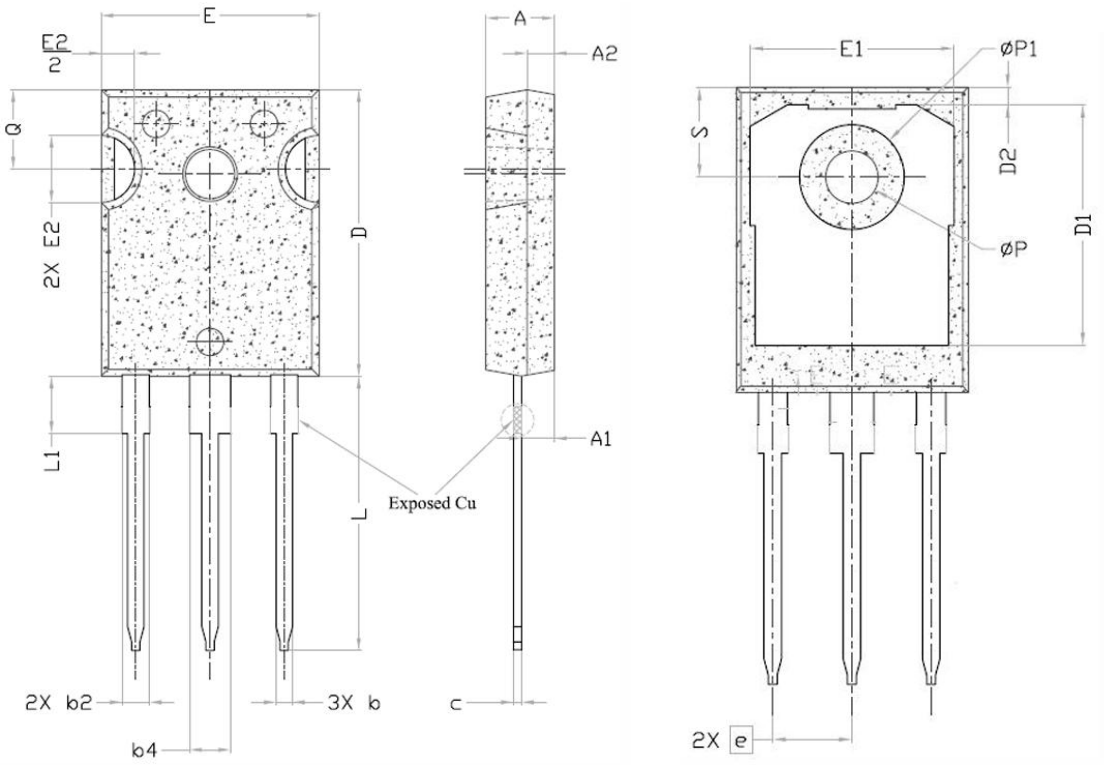


Fig.21 Transient Junction to Case Thermal Impedance

TO-247-3 Package Information



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min.	Max.	Min.	Max.
A	4.830	5.210	0.190	0.205
A1	2.290	2.550	0.090	0.100
A2	1.500	2.490	0.059	0.098
b	1.120	1.330	0.044	0.052
b2	1.910	2.390	0.075	0.094
b4	2.870	3.220	0.113	0.127
c	0.550	0.690	0.022	0.027
D	20.800	21.100	0.819	0.831
D1	16.250	17.650	0.640	0.695
D2	0.510	1.350	0.020	0.053
E	15.750	16.130	0.620	0.635
E1	13.460	14.160	0.530	0.557
E2	4.320	5.490	0.170	0.216
e	5.440 BSC		0.214 BSC	
L	19.810	20.320	0.780	0.800
L1	4.100	4.400	0.161	0.173
ΦP	3.560	3.650	0.140	0.144
ΦP1	7.190 REF.		0.283 REF.	
Q	5.390	6.200	0.212	0.244
S	6.040	6.300	0.238	0.248