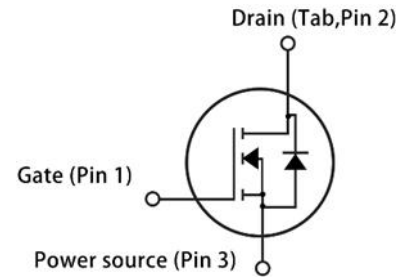


$V_{DS} = 2200\text{ V}$
 $I_D (T_C=25^\circ\text{C}) = 8.7\text{ A}$
 $R_{DS(on),typ} = 900\text{ m}\Omega @ V_{GS}=18\text{ V}$



TO-247-3



Features

- Wide bandgap SiC MOSFET technology
- Low On-Resistance with High Blocking Voltage
- Low Capacitances with High-Speed switching
- Low reverse recovery(Qrr)
- Halogen free, RoHs compliant

Benefits

- Reduce switching losses
- Increased system Switching Frequency
- Increased power density
- Reduction of heat sink requirements

Applications

- Switch mode power supplies
- Auxiliary power supplies
- High voltage capacitive loads

Package Pin Definitions

- Pin1- Gate
- Pin2- Drain
- Pin3- Power Source

Package Parameters

Part Number	Marking	Package
CI7N220SM	CI7N220SM	TO-247-3

Maximum Ratings ($T_C=25^{\circ}\text{C}$ unless otherwise specified)

Symbol	Parameter	Test conditions	Value	Unit	Note
V_{DSmax}	Drain-Source Voltage	$V_{GS} = 0V, I_D = 100\mu A$	2200	V	
V_{GSmax}	Gate-Source voltage	AC ($f > 1\text{ Hz}$)	-10/+25	V	
V_{GSop}	Recommend Gate-Source Voltage	Static	-4/+18	V	
I_D	Continuous Drain current	$V_{GS} = 18V, T_C = 25^{\circ}\text{C}$	8.7	A	Fig. 14
		$V_{GS} = 18V, T_C = 100^{\circ}\text{C}$	6		
$I_{D,pulse}$	Pulsed Drain Current	Pulse with t_p limited by T_{jmax} at 1 ms Pulse with t_p limited by T_{jmax} at 100 μs	9 16	A	Fig. 18
P_D	Power Dissipation	$T_C = 25^{\circ}\text{C}, T_J = 175^{\circ}\text{C}$	94	W	Fig. 16
T_J	Operating junction temperature		-55~175	$^{\circ}\text{C}$	
T_{stg}	Storage temperature		-55~175	$^{\circ}\text{C}$	

Thermal Characteristics Maximum Ratings ($T_C=25^{\circ}\text{C}$ unless otherwise specified)

Symbol	Parameter	Value			Unit	Note
		Min.	Typ.	Max.		
$R_{th(jc)}$	Thermal resistance from Junction to Case		1.6		K/W	Fig. 15
$R_{th(ja)}$	Thermal resistance from Junction to Ambient		40		K/W	

Static Characteristics

Symbol	Parameter	Test conditions	Value			Unit	Note
			Min.	Typ.	Max.		
$V_{(BR)DSS}$	Drain-Source Breakdown voltage	$V_{GS} = 0V, I_D = 100\mu A$	2200			V	
$V_{GS(th)}$	Gate Threshold voltage	$V_{GS} = V_{DS}, I_D = 0.5mA$		2.8		V	Fig. 9
		$V_{GS} = V_{DS}, I_D = 0.5mA, T_j = 175^\circ C$		2.0			
I_{GSS}	Gate-Source Leakage current	$V_{GS} = 18V, V_{DS} = 0V$			250	nA	
I_{DSS}	Zero Gate Voltage Drain Current	$V_{DS} = 2200V, V_{GS} = 0V, T_j = 25^\circ C$		1	50	μA	
$R_{DS(on)}$	Drain-Source On-state Resistance	$V_{GS} = 18V, I_D = 2A$ $V_{GS} = 20V, I_D = 2A$		0.9 0.8	1.4	Ω	Fig. 3, 4, 5
		$V_{GS} = 20V, I_D = 2A, T_j = 175^\circ C$		2			
g_{fs}	Transconductance	$V_{DS} = 18V, I_D = 2A$		1		S	Fig. 6
		$V_{DS} = 18V, I_D = 2A, T_j = 175^\circ C$		0.8			

Gate Charge Characteristics

Symbol	Parameter	Test conditions	Value			Unit	Note
			Min.	Typ.	Max.		
Q_{GS}	Gate to Source Charge	$V_{DS} = 1200V$ $I_D = 2A$ $V_{GS} = -4V/18V$		1.7		nC	Fig. 10
Q_{GD}	Gate to Drain Charge			9			
Q_G	Total Gate Charge			15			

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

Symbol	Parameter	Test conditions	Value			Unit	Note
			Min.	Typ.	Max.		
C_{iss}	Input Capacitance	$V_{GS} = 0V, V_{DS} = 1000V$ $f = 1\text{ MHz}$ $V_{AC} = 25mV$		168		pF	Fig. 13
C_{oss}	Output Capacitance			13		pF	
C_{rss}	Reverse Transfer Capacitance			2.7		pF	
$R_{G(int)}$	Internal Gate Resistance	$f=1\text{ MHz}, V_{AC} = 25mV$		6		Ω	

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

Symbol	Parameter	Test conditions	Value			Unit	Note
			Min.	Typ.	Max.		
V_{SD}	Diode Forward Voltage	$V_{GS} = -4\text{V}, I_{SD} = 1\text{A}$		3.7		V	Fig. 7,8
		$V_{GS} = -4\text{V}, I_{SD} = 1\text{A}, T_J = 175^{\circ}\text{C}$		3.3			
I_S	Continuous Diode Forward Current	$V_{GS} = -4\text{V}, T_C = 25^{\circ}\text{C}$		8		A	
$I_{S, pulse}$	Diode pulse Current	$V_{GS} = -5\text{V}$, pulse width t_p limited by T_{Jmax}		9		A	

Typical Performance

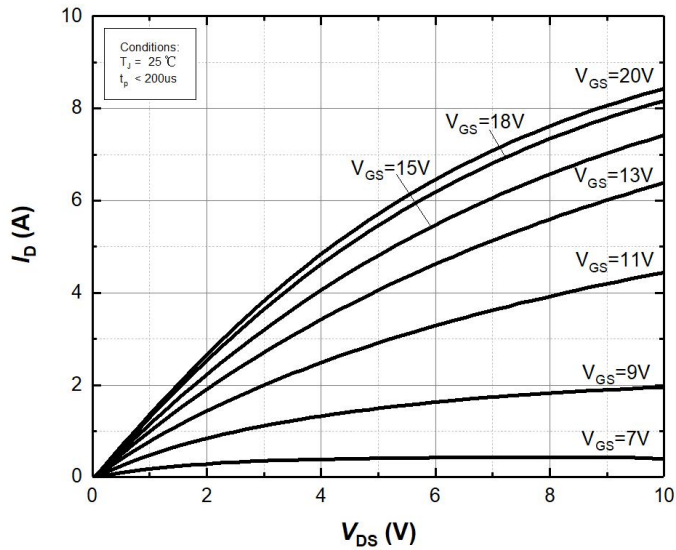


Figure 1. Output characteristics at $T_j=25^\circ\text{C}$

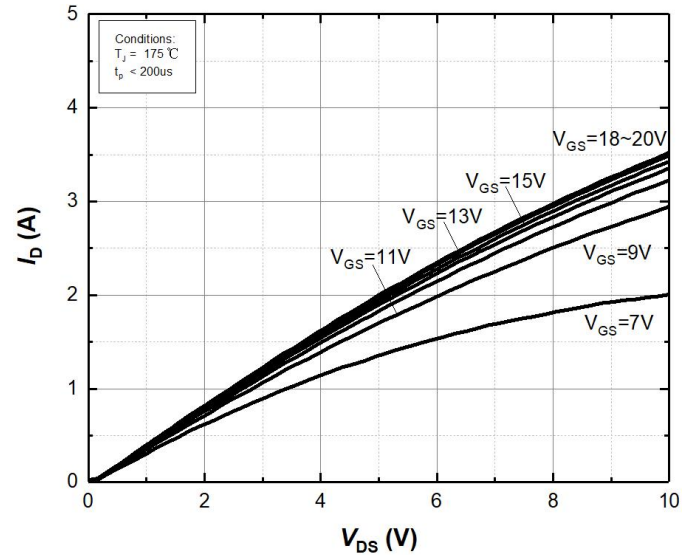


Figure 2. Output characteristics at $T_j=175^\circ\text{C}$

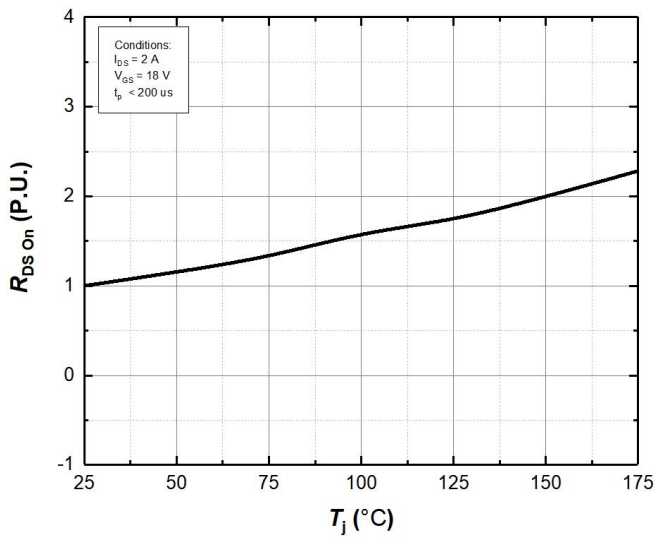


Figure 3. Normalized On-Resistance vs. Temperature

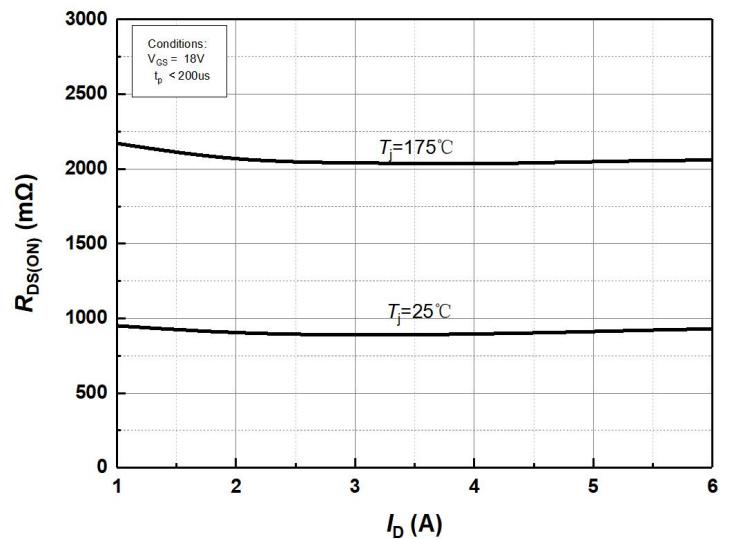


Figure 4. On-Resistance vs. Drain current for Various Temperature

Typical Performance

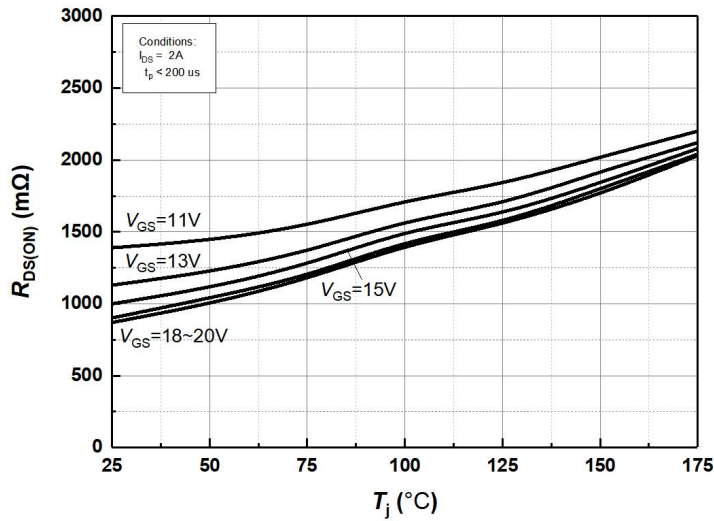


Figure 5. On-Resistance vs. Temperature for Various Gate Voltage

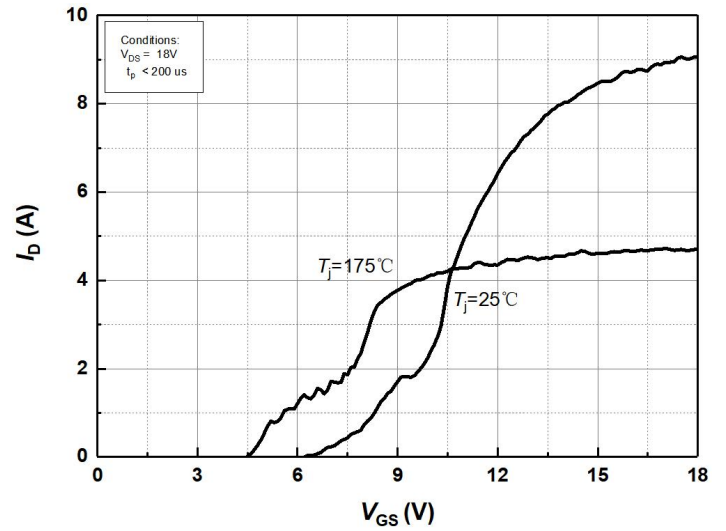


Figure 6. Transfer Characteristics for Various Junction Temperatures

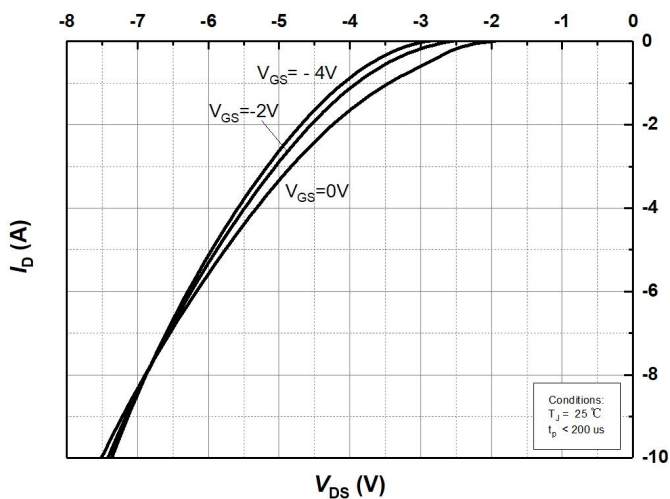


Figure 7. Body Diode Characteristics at $T_j=25^{\circ}\text{C}$

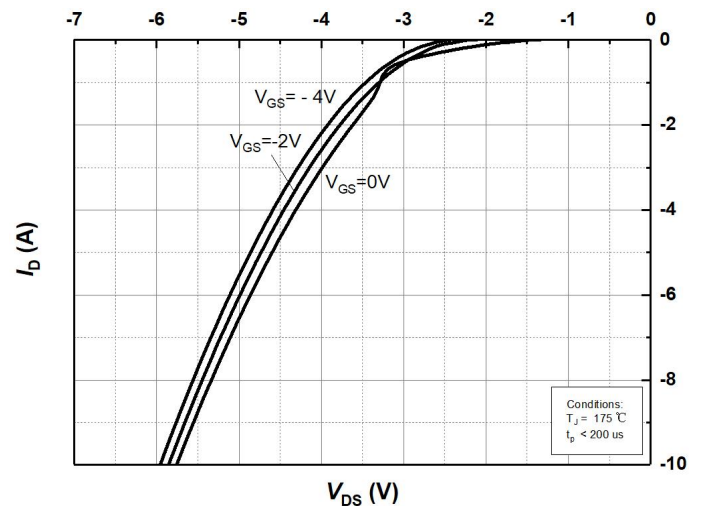


Figure 8. Body Diode Characteristics at $T_j=175^{\circ}\text{C}$

Typical Performance

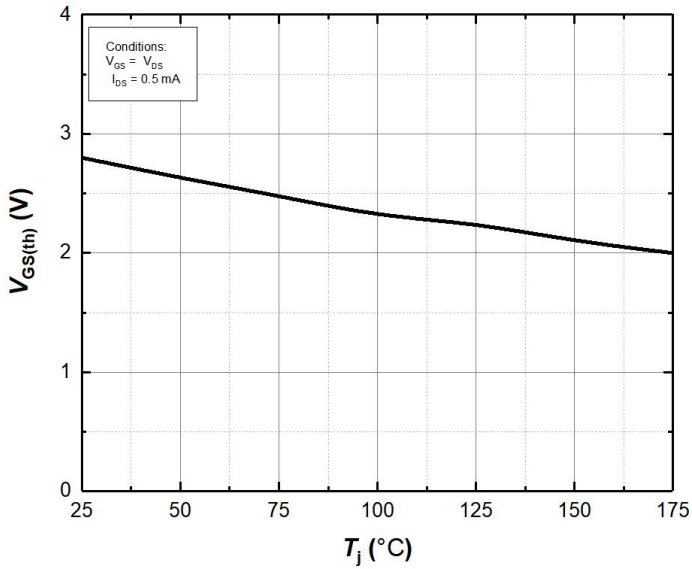


Figure 9. Threshold Voltage vs. Temperature

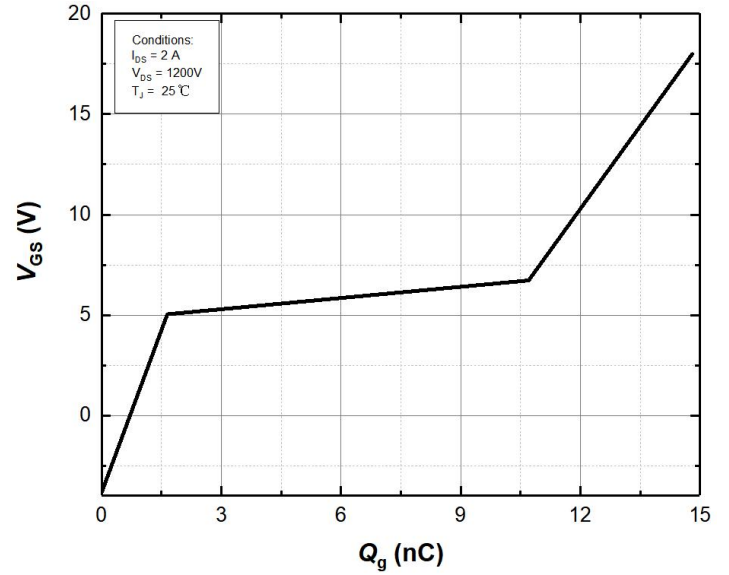


Figure 10 Gate Charge Characteristics

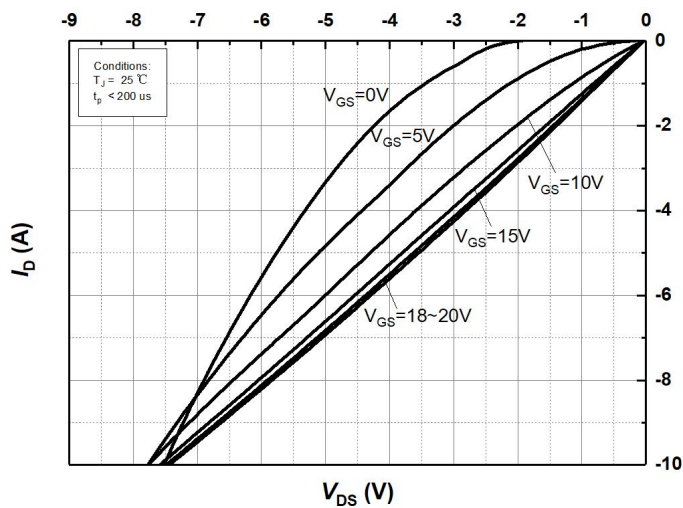


Figure 11. 3rd Quadrant Characteristic at $T_j=25^{\circ}\text{C}$

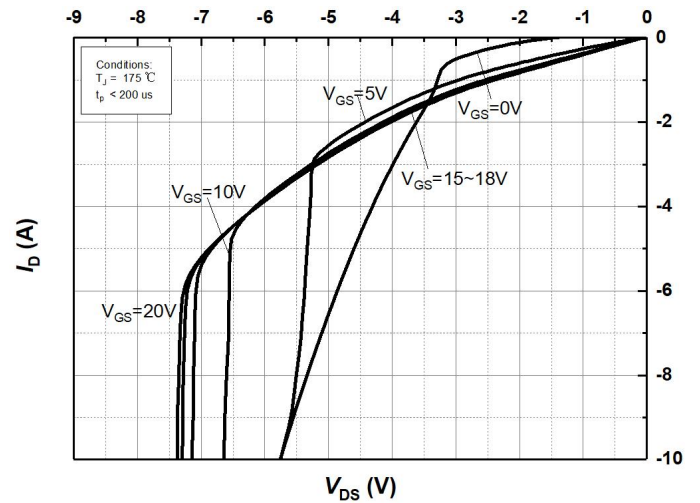


Figure 12. 3rd Quadrant Characteristic at $T_j=175^{\circ}\text{C}$

Typical Performance

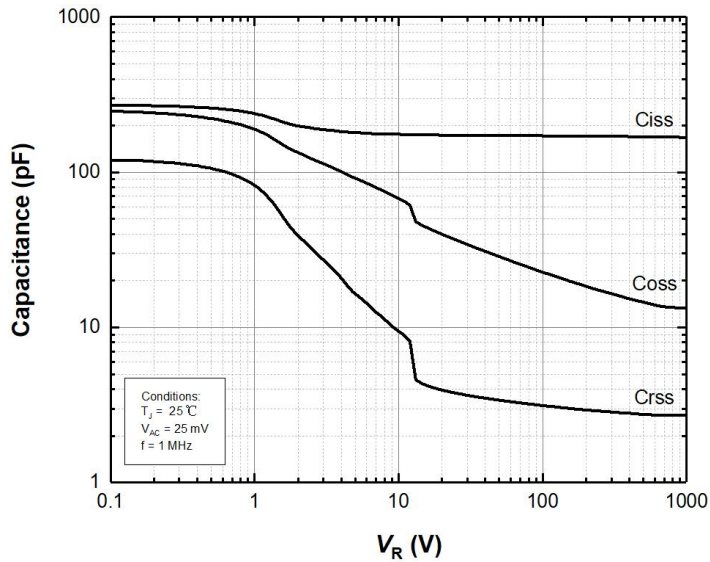


Figure 13. Capacitances vs. Drain-Source Voltage (0 – 1000V)

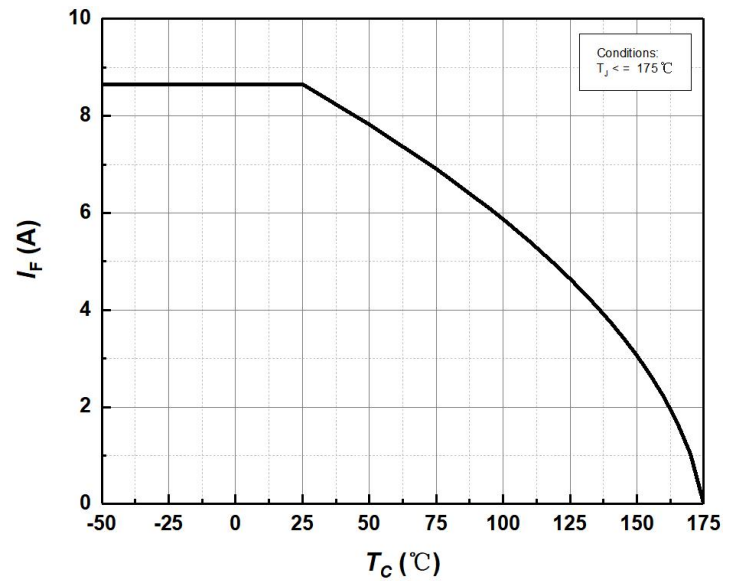


Figure 14. Continuous Drain Current Derating vs Case Temperature

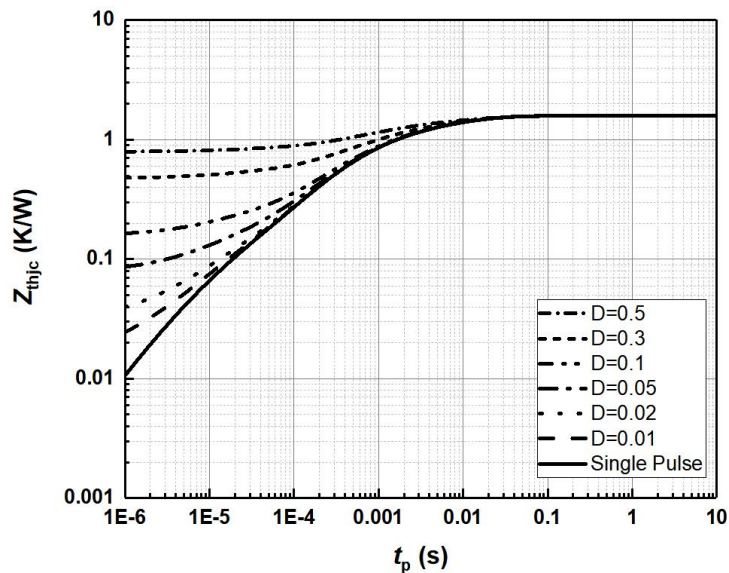


Figure 15. Transient Thermal Impedance (Junction – Case)

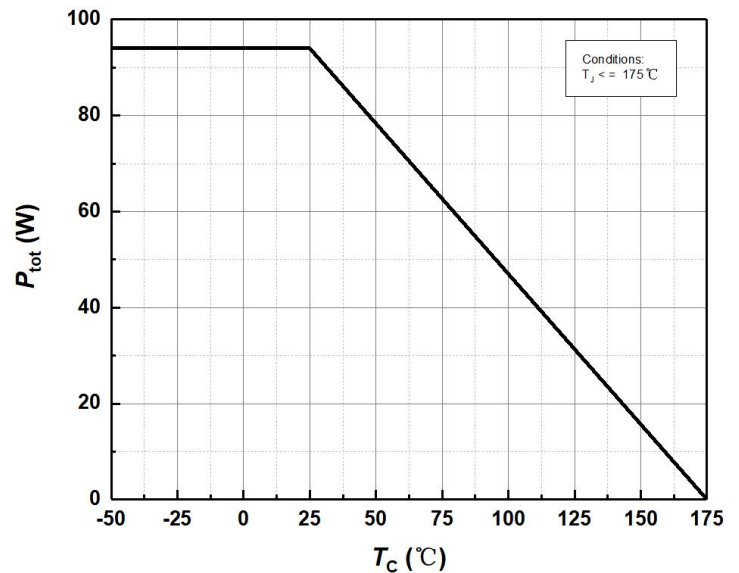


Figure 16. Maximum Power Dissipation Derating vs. Case Temperature

Typical Performance

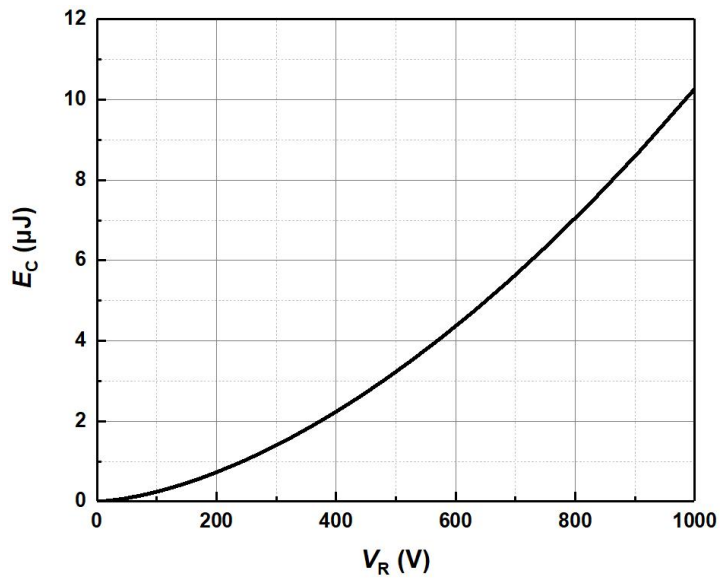


Figure 17. Output Capacitor Stored Energy

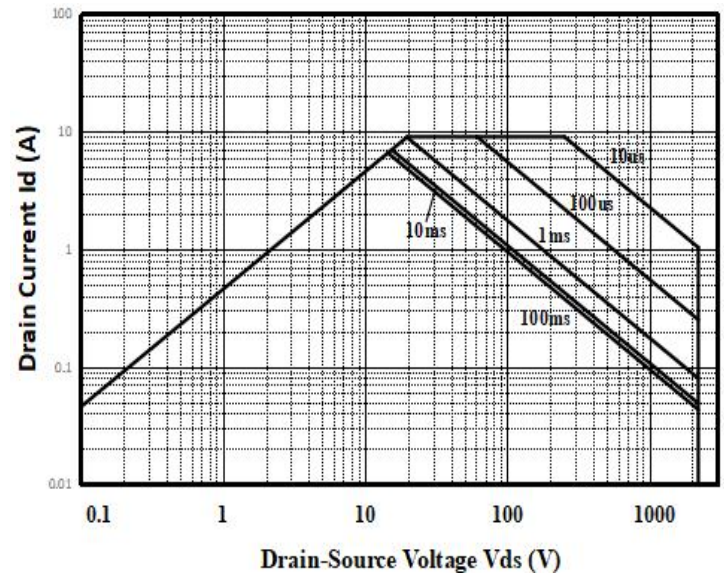
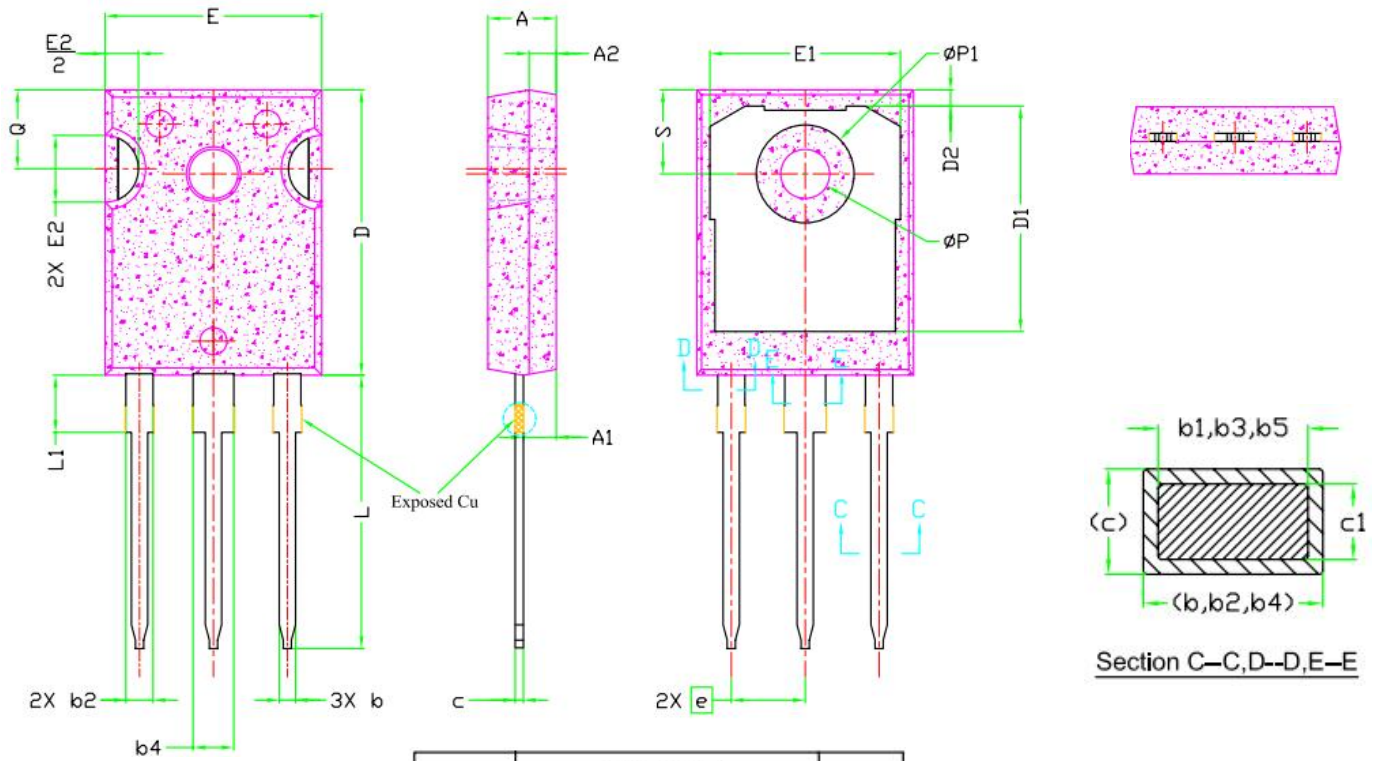


Figure 18. Safe Operating Area

Package Dimensions



SYMBOL	DIMENSIONS			NOTES
	MIN.	NOM.	MAX.	
A	4,83	5,02	5,21	
A1	2,29	2,41	2,55	
A2	1,50	2,00	2,49	
b	1,12	1,20	1,33	
b1	1,12	1,20	1,28	
b2	1,91	2,00	2,39	6
b3	1,91	2,00	2,34	
b4	2,87	3,00	3,22	6, 8
b5	2,87	3,00	3,18	
c	0,55	0,60	0,69	6
c1	0,55	0,60	0,65	
D	20,80	20,95	21,10	4
D1	16,25	16,55	17,65	5
D2	0,51	1,19	1,35	
E	15,75	15,94	16,13	4
E1	13,46	14,02	14,16	5
E2	4,32	4,91	5,49	3
e	5,44BSC			
L	19,81	20,07	20,32	
L1	4,10	4,19	4,40	6
ØP	3,56	3,61	3,65	7
ØP1	7,19REF.			
Q	5,39	5,79	6,20	
S	6,04	6,17	6,30	