



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

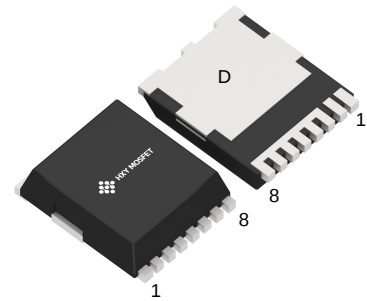
- Reduce switching losses
- Increased system Switching Frequency
- Increased power density
- Reduction of heat sink requirements

Applications

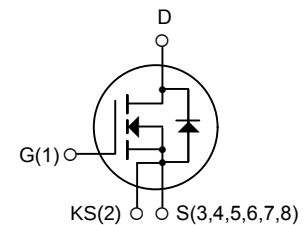
- Switch mode power supplies
- Renewable energy
- On Board Charger
- High Voltage DC/DC Converters



Ordering Part Number	Package	Brand
SIHK125N65E-T1-GE3	TOLLS	HXY MOSFET



TOLLS



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

Symbol	Parameter	Test conditions	Value	Unit	Note
V_{DSmax}	Drain-Source Voltage	$V_{GS} = 0V, I_D = 100\mu A$	650	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	$V_{GS} = 18V, T_c = 25^\circ\text{C}$	36	A	Fig. 14
		$V_{GS} = 18V, T_c = 100^\circ\text{C}$	26		
$I_{D,pulse}$	Pulsed Drain Current	Pulse with t_p limited by T_{jmax}	53	A	Fig.18
P_D	Power Dissipation	$T_c = 25^\circ\text{C}, T_j = 175^\circ\text{C}$	181	W	Fig.16
T_j	Operating junction temperature		-55~175	$^\circ\text{C}$	
T_{stg}	Storage temperature		-55~175	$^\circ\text{C}$	



Thermal Characteristics

Symbol	Parameter	Value			Unit	Note
		Min.	Typ.	Max.		
$R_{th(jc)}$	Thermal resistance from Junction to Case		0.83		K/W	Fig. 15
$R_{th(ja)}$	Thermal resistance from Junction to Ambient		53		K/W	

Electrical Characteristics (T_c = 25°C unless other wise specified)

Static Characteristics

Symbol	Parameter	Test conditions	Value			Unit	Note
			Min.	Typ.	Max.		
$V_{(BR)DSS}$	Drain-Source Breakdown voltage	$V_{GS} = 0V, I_D = 100\mu A$	650			V	
$V_{GS(th)}$	Gate Threshold voltage	$V_{GS} = V_{DS}, I_D = 5mA$		2.7		V	Fig. 9
		$V_{GS} = V_{DS}, I_D = 5mA, T_j = 175^\circ C$		1.8			
I_{GSS}	Gate-Source Leakage current	$V_{GS} = 18V, V_{DS} = 0V$			250	nA	
I_{DSS}	Zero Gate Voltage Drain Current	$V_{DS} = 650V, V_{GS} = 0V, T_j = 25^\circ C$		1	50	μA	
$R_{DS(on)}$	Drain-Source On-state Resistance	$V_{GS} = 18V, I_D = 10A$		105	150	m Ω	Fig. 3, 4, 5
		$V_{GS} = 20V, I_D = 10A$		94			
		$V_{GS} = 18V, I_D = 10A, T_j = 175^\circ C$		140			
		$V_{GS} = 20V, I_D = 10A, T_j = 175^\circ C$		130			
g_{fs}	Transconductance	$V_{DS} = 18V, I_D = 10A$		13		S	Fig. 6
		$V_{DS} = 18V, I_D = 10A, T_j = 175^\circ C$		9			



Gate Charge Characteristics

Symbol	Parameter	Test conditions	Value			Unit	Note
			Min.	Typ.	Max.		
Q_{GS}	Gate to Source Charge	$V_{DS} = 400V$ $I_D = 10A$ $V_{GS} = -4V/18V$		8.3		nC	Fig. 10
Q_{GD}	Gate to Drain Charge			12.1			
Q_G	Total Gate Charge			35.8			

AC Characteristics

Symbol	Parameter	Test conditions	Value			Unit	Note
			Min.	Typ.	Max.		
C_{iss}	Input Capacitance	$V_{GS} = 0V, V_{DS} = 600V$ $f = 1\text{ MHz}$ $V_{AC} = 25mV$		767		pF	Fig. 13
C_{oss}	Output Capacitance			55		pF	
C_{rss}	Reverse Transfer Capacitance			7		pF	
$R_{G(int)}$	Internal Gate Resistance	$f = 1\text{ MHz}, V_{AC} = 25mV$		2.8		Ω	

Reverse Diode Characteristics

Symbol	Parameter	Test conditions	Value			Unit	Note
			Min.	Typ.	Max.		
V_{SD}	Diode Forward Voltage	$V_{GS} = -5V, I_{SD} = 7.5A$		4.0		V	Fig. 7,8
		$V_{GS} = -5V, I_{SD} = 7.5A, T_j = 175^\circ C$		3.5			
I_S	Continuous Diode Forward Current	$V_{GS} = -5V, T_C = 25^\circ C$		34		A	
$I_{S, pulse}$	Diode pulse Current	$V_{GS} = -5V, \text{pulse width } t_p \text{ limited by } T_{jmax}$		53		A	



Typical Performance

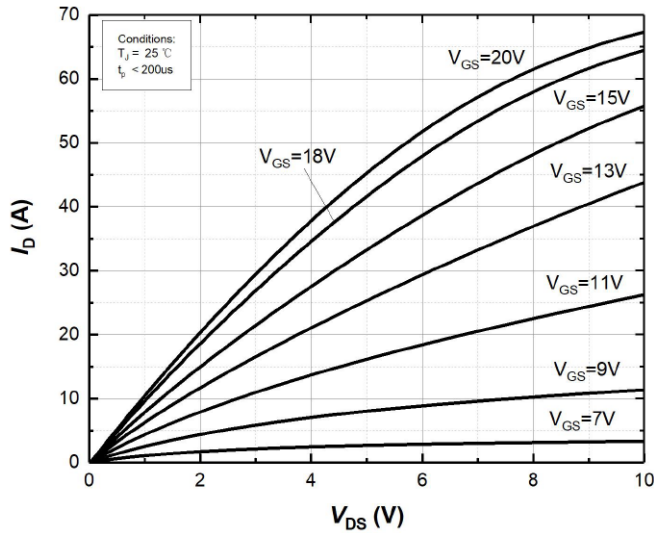


Figure 1. Output characteristics at $T_j=25^\circ\text{C}$

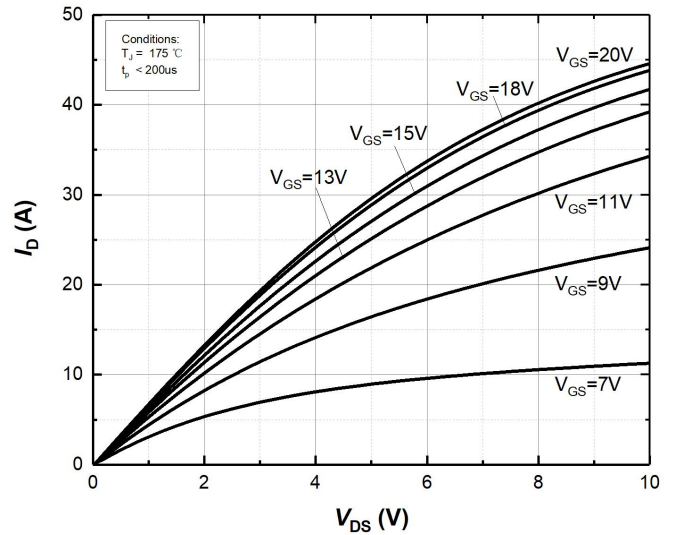


Figure 2. Output characteristics at $T_j=175^\circ\text{C}$

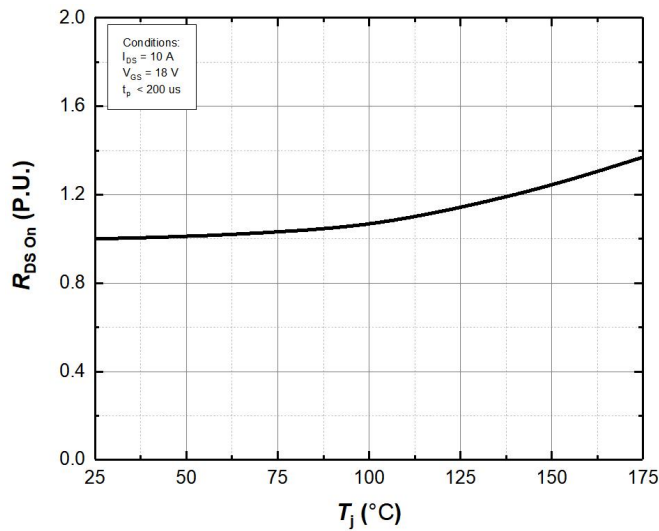


Figure 3. Normalized On-Resistance vs. Temperature

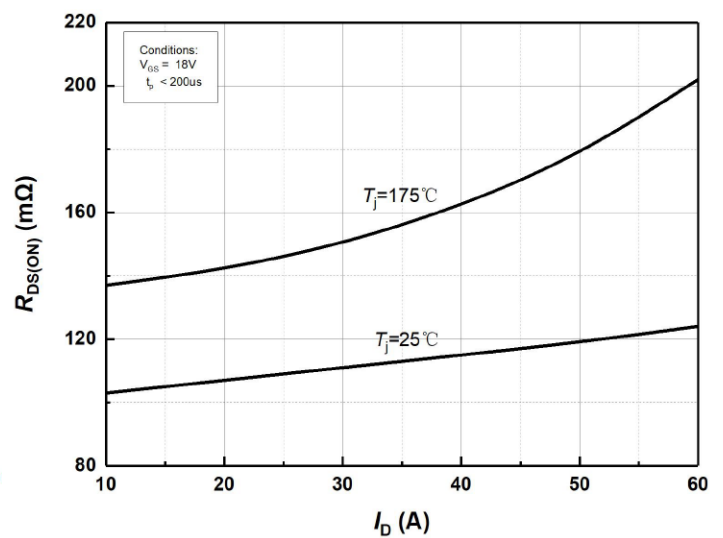


Figure 4. On-Resistance vs. Drain current for Various Temperature

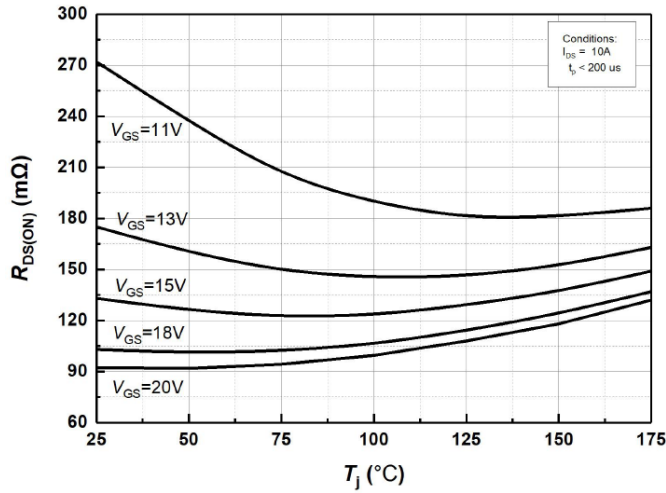


Figure 5. On-Resistance vs. Temperature for Various Gate Voltage

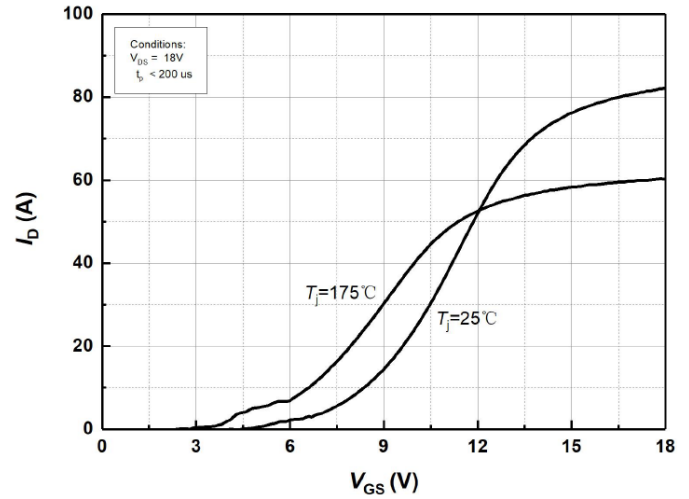


Figure 6. Transfer Characteristics for Various Junction Temperatures

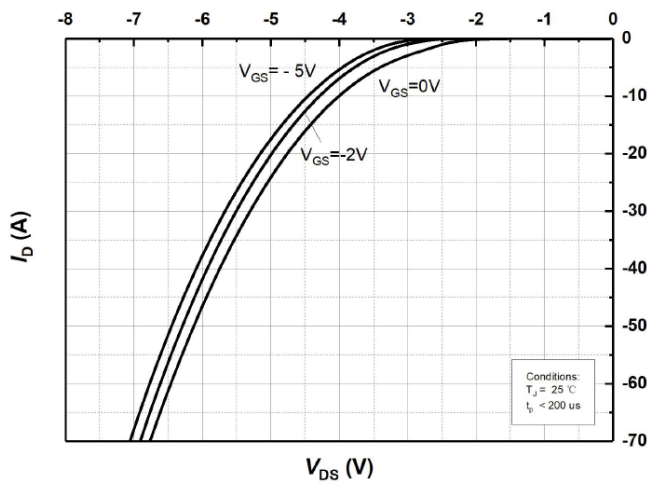


Figure 7. Body Diode Characteristics at $T_J=25^{\circ}C$

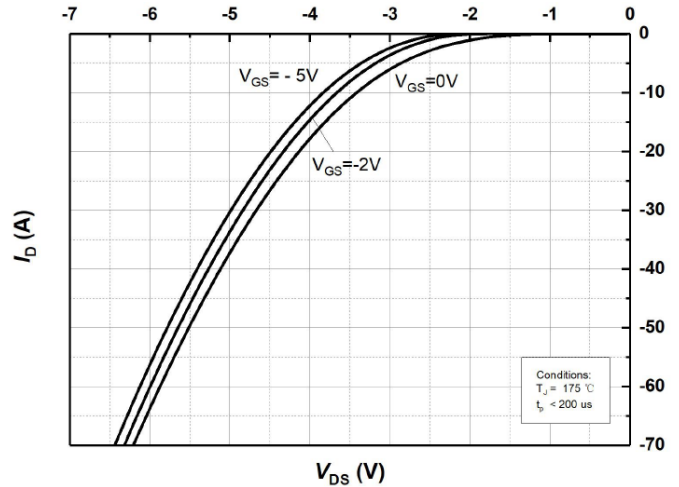


Figure 8. Body Diode Characteristics at $T_J=175^{\circ}C$

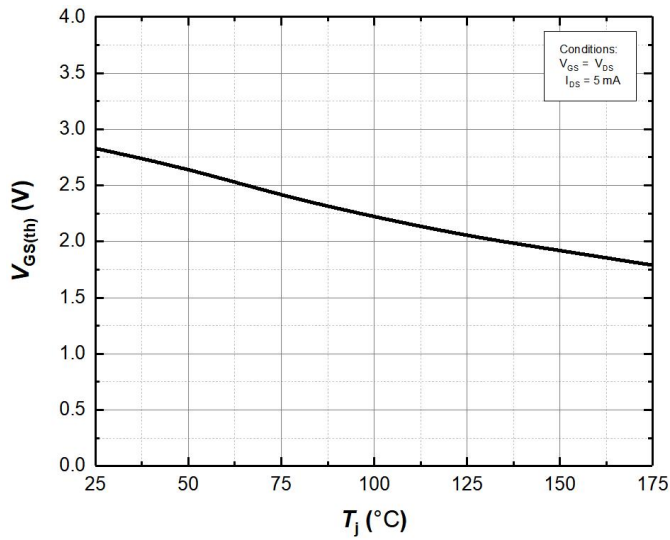


Figure 9. Threshold Voltage vs. Temperature

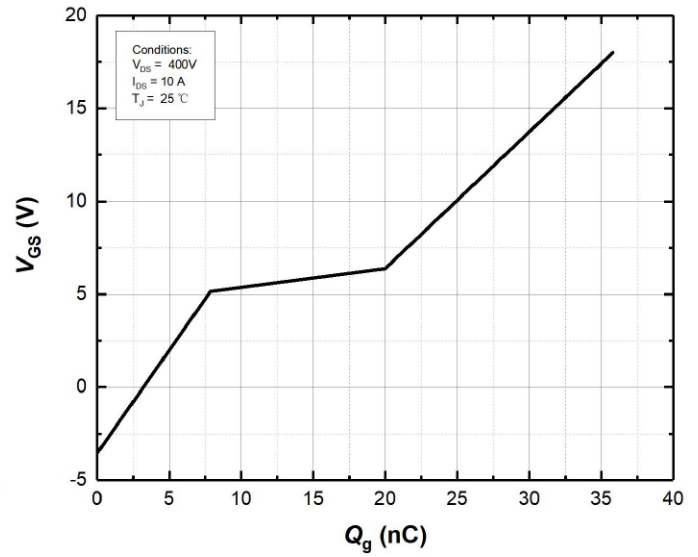


Figure 10 Gate Charge Characteristics

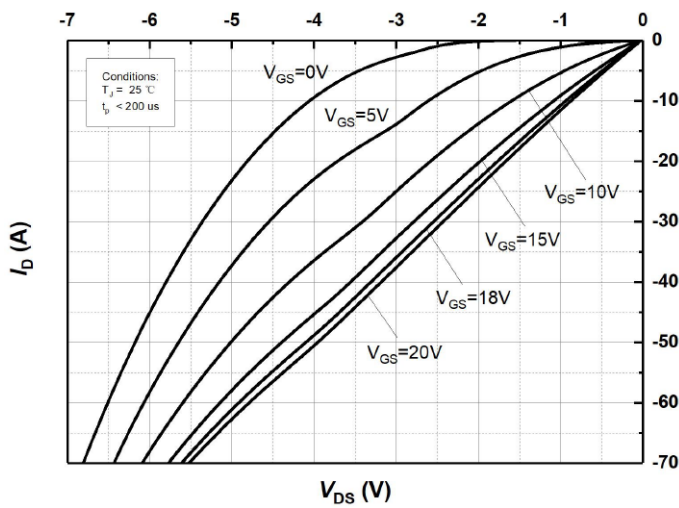


Figure 11. 3rd Quadrant Characteristic at $T_j=25\text{°C}$

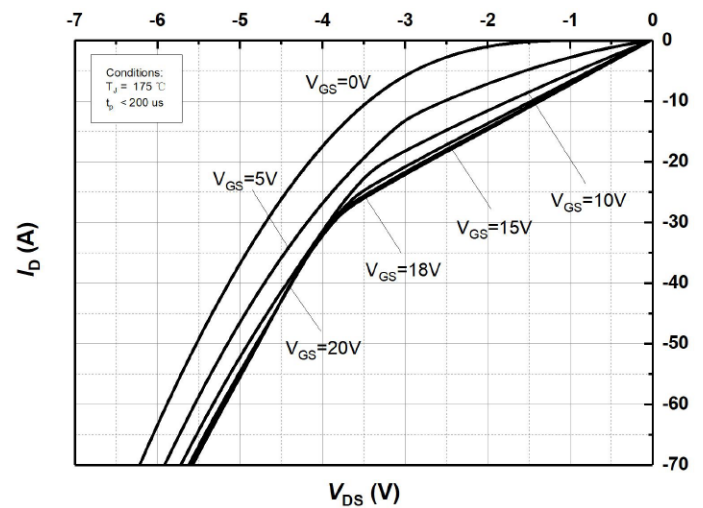


Figure 12. 3rd Quadrant Characteristic at $T_j=175\text{°C}$

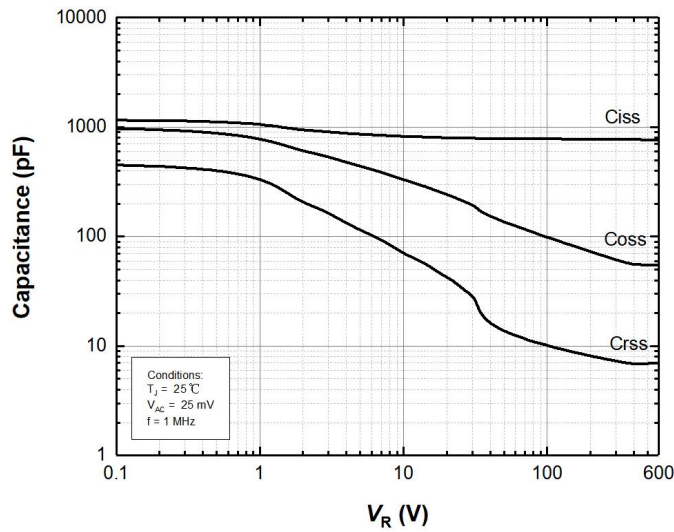


Figure 13. Capacitances vs. Drain-Source Voltage (0 – 600V)

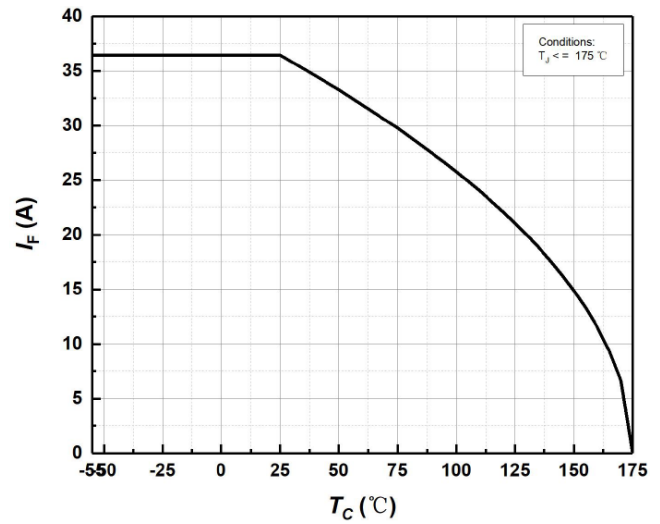


Figure 14. Continuous Drain Current Derating vs Case Temperature

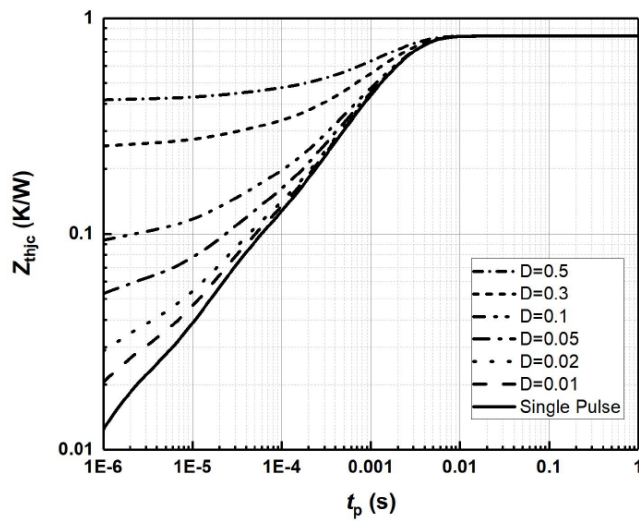


Figure 15. Transient Thermal Impedance (Junction – Case)

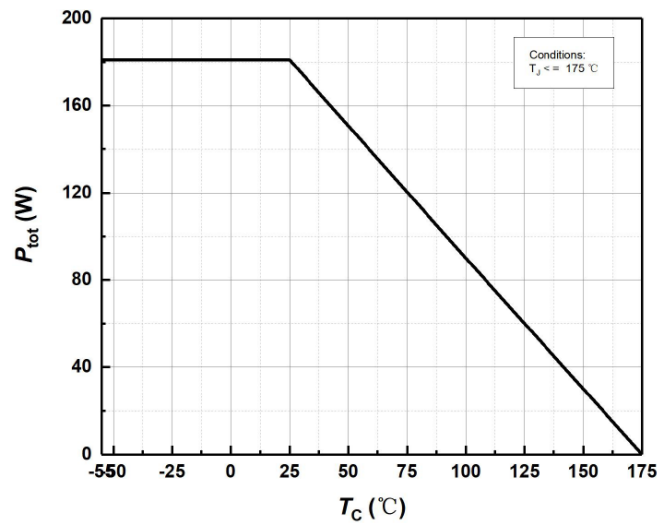


Figure 16. Maximum Power Dissipation Derating vs. Case Temperature

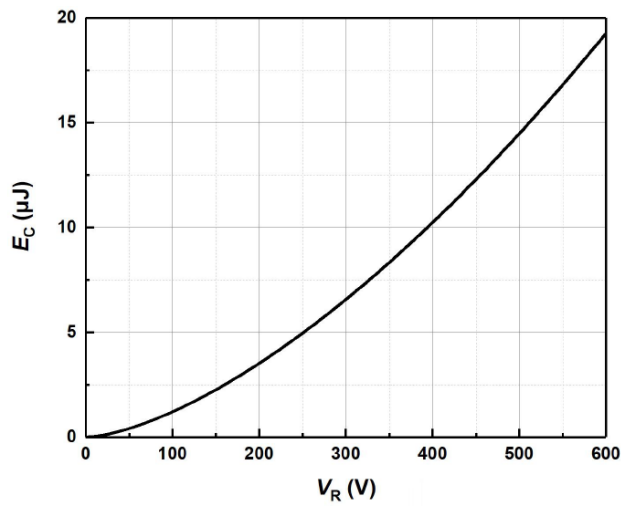


Figure 17. Output Capacitor Stored Energy

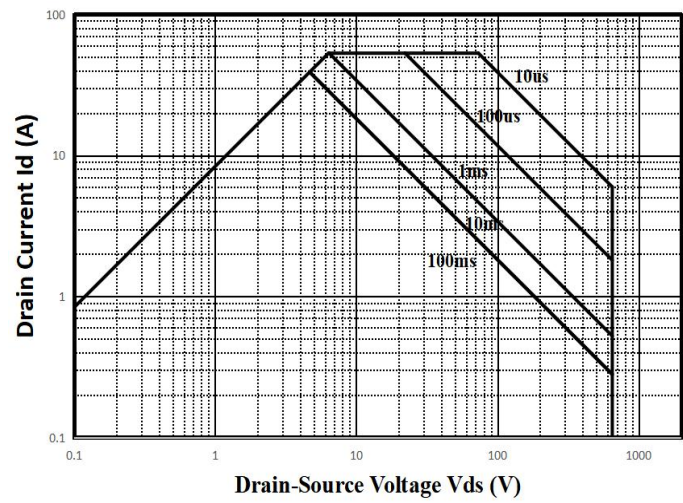
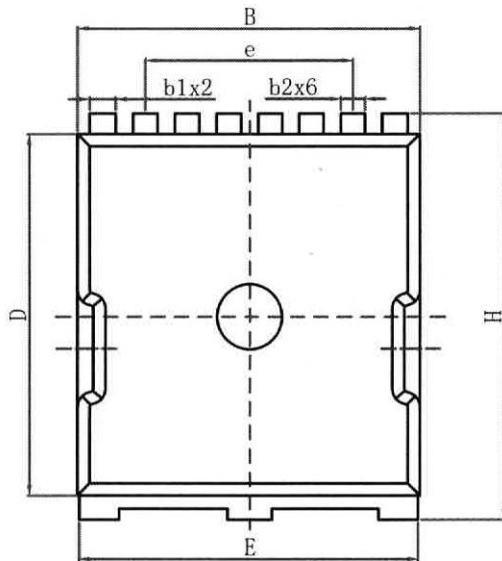


Figure 18. Safe Operating Area



Package Dimensions

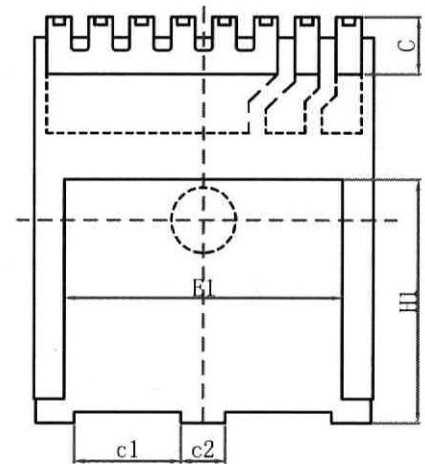
Package TOLLS



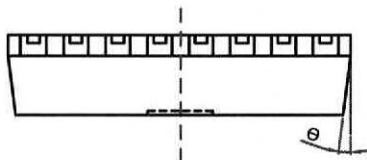
TOP VIEW



SIDE VIEW



BOTTOM VIEW



FRONT VIEW

SYMBOL	MIN	NOM	MAX
A	2.20	2.30	2.40
B	9.85	9.90	9.95
C	1.50	1.60	1.70
D	10.40	10.50	10.60
E	9.75	9.80	9.85
E1	7.95	8.10	8.25
H	11.60	11.70	11.80
H1	6.80	6.95	7.10
L1	0.55	0.65	0.75
L2	0.65	0.70	0.75
e	6.0BSC		
e1	0.45	0.50	0.55
b1	0.70	0.75	0.80
b2	0.60	0.70	0.80
c1	3.00	3.10	3.20
c2	1.10	1.20	1.30
θ	11°		



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