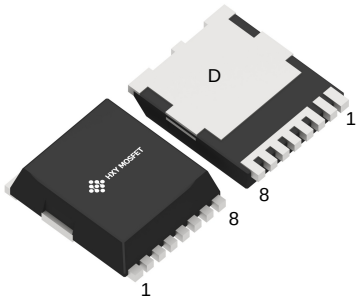
TK115U65Z5,RQ

SiC Power MOSFET N-Channel Enhancement Mode

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



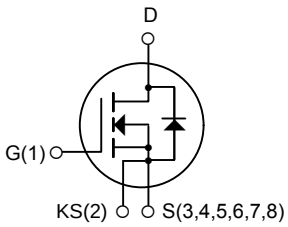
TOLLS

Benefits

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

Applications

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



Ordering Part Number	Package	Brand
TK115U65Z5,RQ	TOLLS	HXY MOSFET

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

Symbol	Parameter	Test conditions	Value	Unit	Note
V_{DSmax}	Drain-Source Voltage	V_{GS} = 0V, I_D = 100μA	650	V	
V_{GSmax}	Gate-Source voltage	AC (f > 1 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°C	36	A	Fig. 14
		V_{GS} = 18V, T_C = 100°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°C, Tj = 175°C	181	W	Fig.16
T_j	Operating junction temperature		-55~175	°C	
T_{stg}	Storage temperature		-55~175	°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 = 100μA	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°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°C		1	50	μA	
$R_{DS(on)}$	Drain-Source On-state Resistance	V_{GS} = 18V, I_D =10A V_{GS} = 20V, I_D =10A		105 94	150	mΩ	Fig. 3, 4 , 5
		V_{GS} = 18V, I_D =10A, T_j = 175°C V_{GS} = 20V, I_D =10A, T_j = 175°C		140 130			
g_{fs}	Transconductance	V_{DS} = 18V, I_D =10A		13		S	Fig. 6
		V_{DS} = 18V, I_D =10A, T_j = 175°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 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 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°C		3.5			
I_S	Continuous Diode Forward Current	V_{GS} =-5V , T_C = 25°C		34		A	
$I_{S,\ pulse}$	Diode pulse Current	V_{GS} =-5V,pulse width t_p limited by T_{jmax}		53		A	

Typical Performance

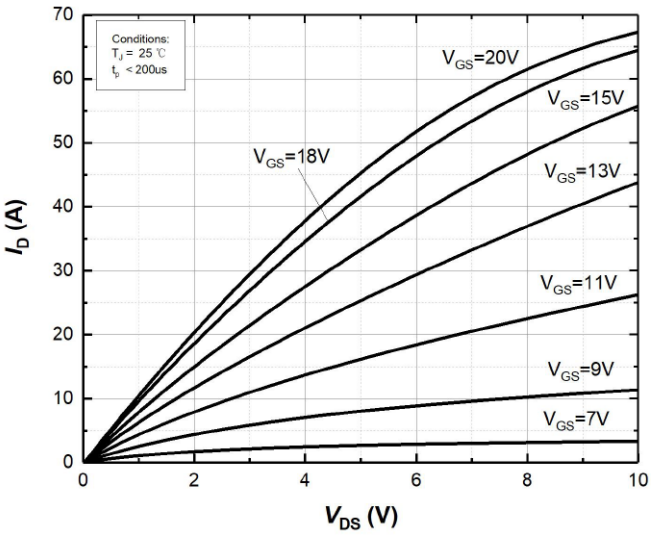


Figure 1. Output characteristics at Tj=25°C

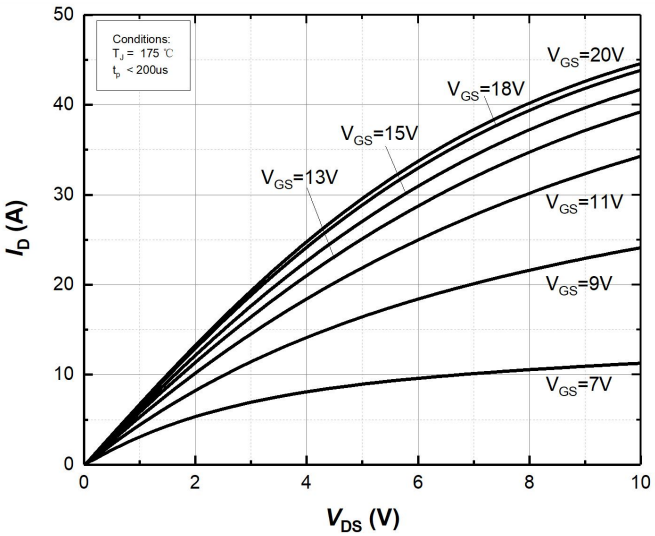


Figure 2. Output characteristics at Tj=175°C

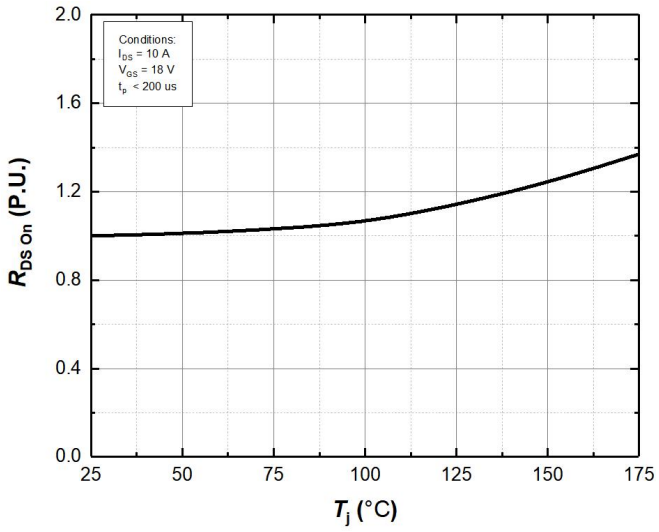


Figure 3. Normalized On-Resistance vs. Temperature

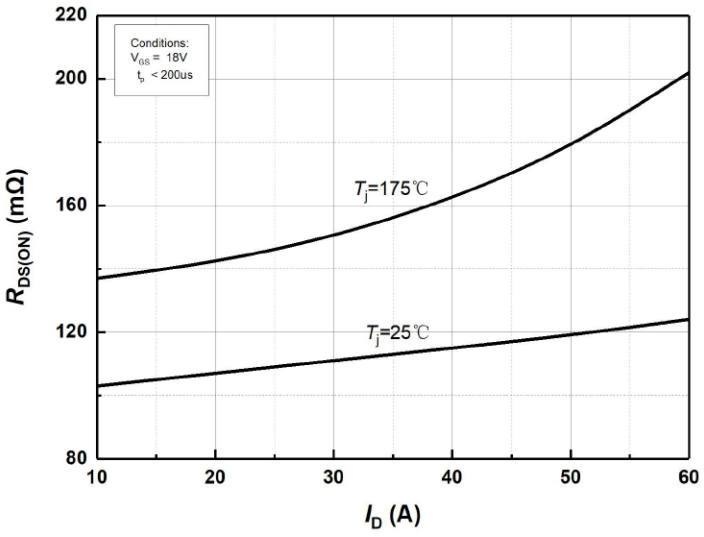


Figure 4. On-Resistance vs. Drain current for Various Temperature

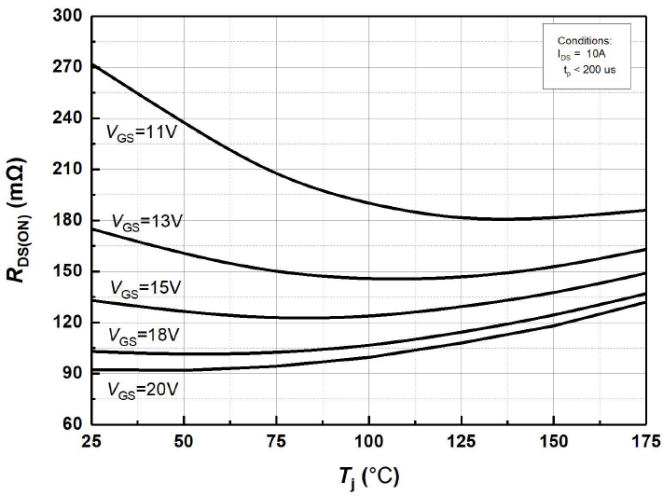


Figure 5. On-Resistance vs. Temperature for Various Gate Voltage

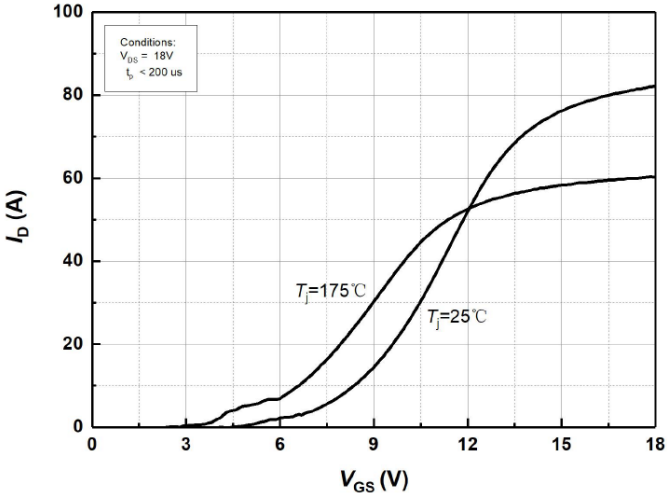


Figure 6. Transfer Characteristics for Various Junction Temperatures

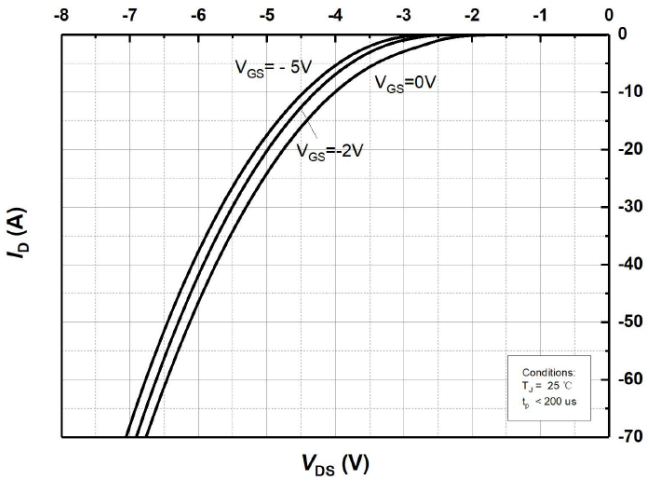


Figure 7. Body Diode Characteristics at Tj=25°C

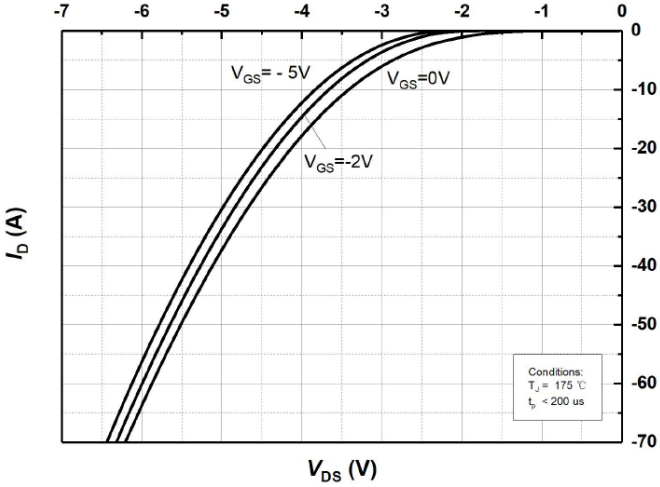


Figure 8. Body Diode Characteristics at Tj=175°C

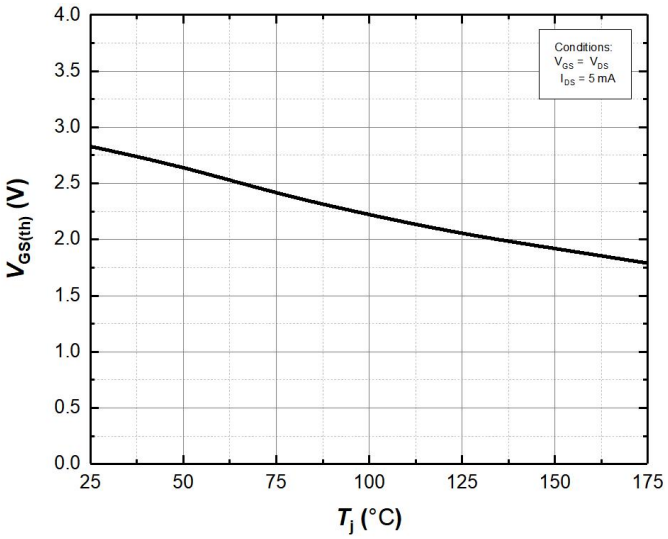


Figure 9. Threshold Voltage vs. Temperature

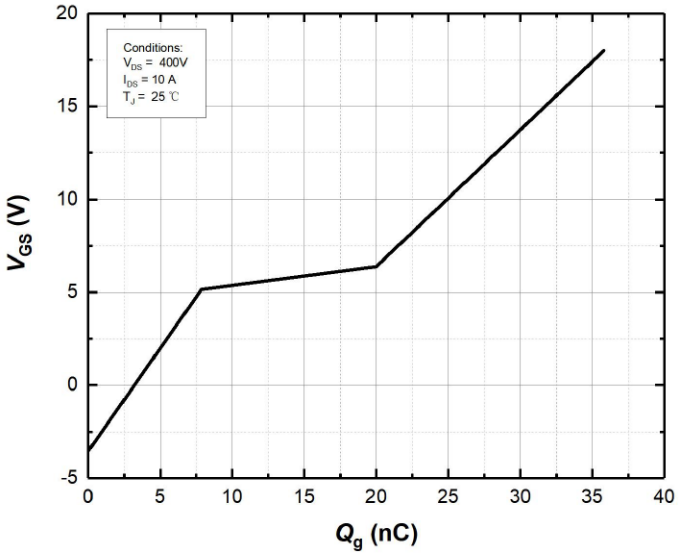


Figure 10 Gate Charge Characteristics

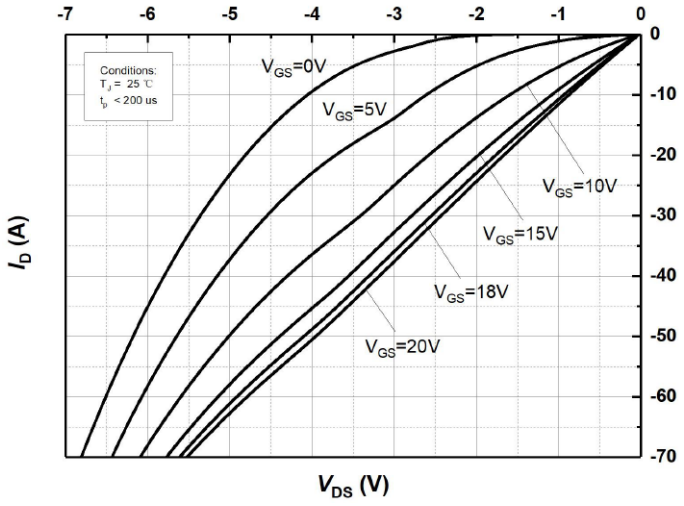


Figure 11. 3rd Quadrant Characteristic at Tj=25°C

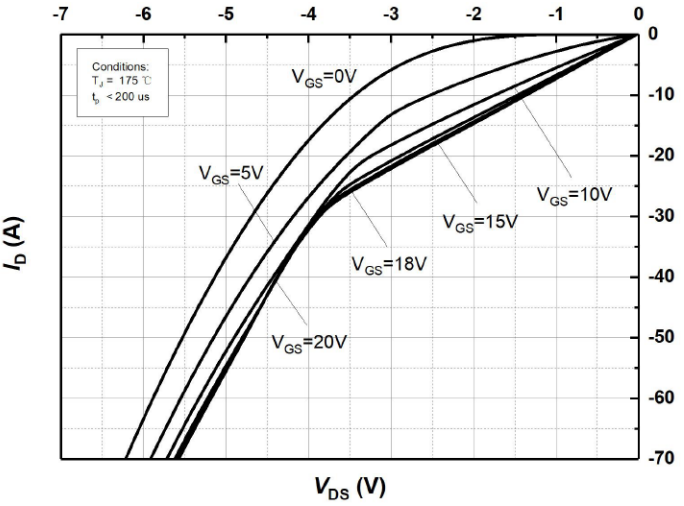


Figure 12. 3rd Quadrant Characteristic at Tj=175°C

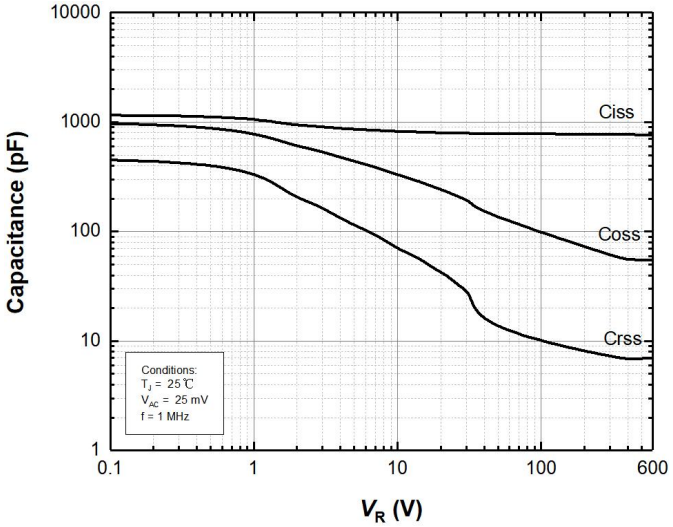


Figure 13. Capacitances vs. Drain-Source Voltage (0 – 600V)

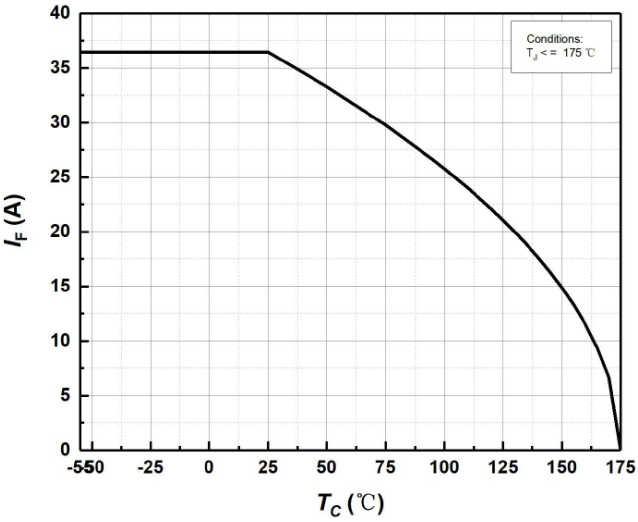


Figure 14. Continuous Drain Current Derating vs Case Temperature

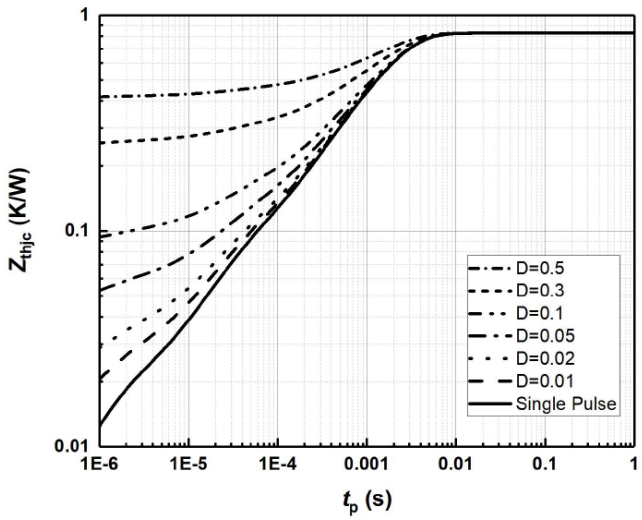


Figure 15.Transient Thermal Impedance (Junction – Case)

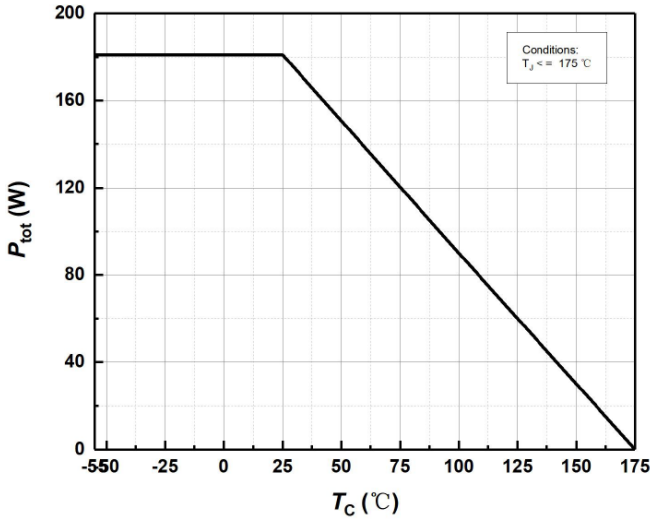


Figure 16. Maximum Power Dissipation Derating vs. Case Temperature

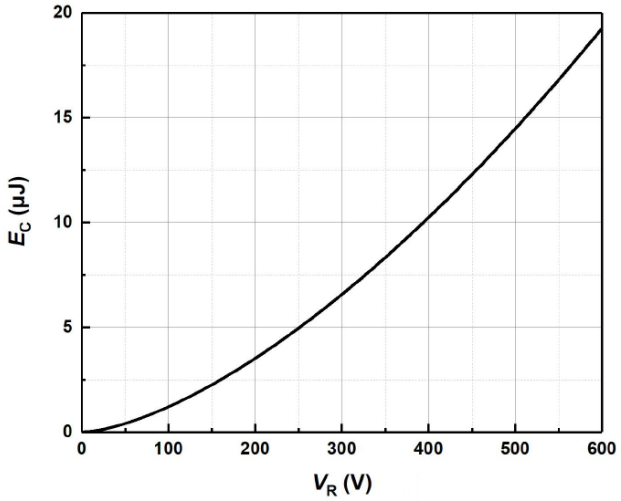


Figure 17. Output Capacitor Stored Energy

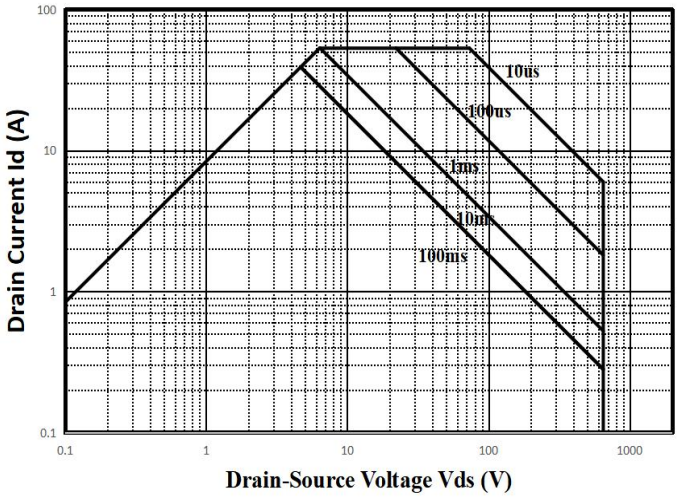
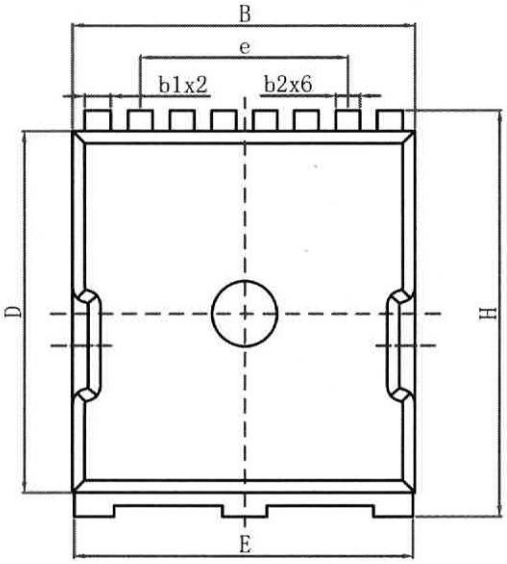


Figure 18. Safe Operating Area

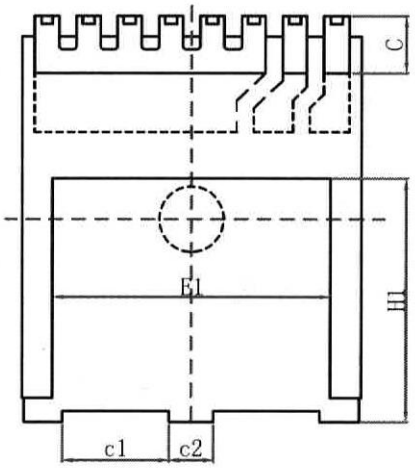
Package Dimensions

Package TOLLS

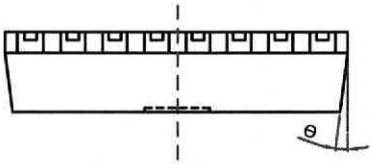


TOP VIEW

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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