



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

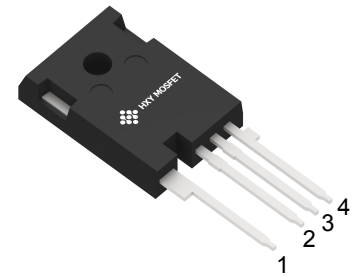
- Reduce switching losses
- Increased system Switching Frequency
- Increased power density
- Reduction of heat sink requirements

Applications

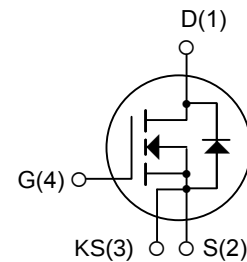
- Switch mode power supplies
- Renewable energy
- On Board Charger
- High Voltage DC/DC Converters



Ordering Part Number	Package	Brand
TK090Z65Z,S1F	TO-247H-4L	HXY MOSFET



TO-247H-4L



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_{GS}	Gate-Source voltage (transient)	$t_p \leq 500ns, \text{duty cycle} \leq 1\%$	-8/+20	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
		$V_{GS} = 18V, T_c = 100^\circ\text{C}$	25		
$I_{D,pulse}$	Pulsed Drain Current	Pulse with t_p limited by T_{jmax}	57	A	
P_D	Power Dissipation	$T_c = 25^\circ\text{C}, T_j = 175^\circ\text{C}$	127	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		1.18		K/W	Fig. 15
$R_{th(ja)}$	Thermal resistance from Junction to Ambient		40		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	$V_{GS} = V_{DS}, I_D = 5mA$		2.3		V	Fig. 9
		$V_{GS} = V_{DS}, I_D = 5mA, T_j = 175^\circ C$		1.6			
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	$V_{GS} = 15V, I_D = 15A$		90		m Ω	Fig. 3, 4, 5
		$V_{GS} = 18V, I_D = 15A$		75	105		
		$V_{GS} = 15V, I_D = 15A, T_j = 175^\circ C$		112			
		$V_{GS} = 18V, I_D = 15A, T_j = 175^\circ C$		105			
g_{fs}	Transconductance	$V_{DS} = 15V, I_D = 15A$		10		S	Fig. 6
		$V_{DS} = 15V, I_D = 15A, T_j = 175^\circ C$		9			



Gate Charge Characteristics

Symbol	Parameter	Test conditions	Value			Unit	Note
			Min.	Typ.	Max.		
Q_{GS}	Gate to Source Charge	$V_{DS} = 400V$ $I_D = 15A$ $V_{GS} = -4V/18V$		11.3		nC	Fig. 10
Q_{GD}	Gate to Drain Charge			10.4			
Q_G	Total Gate Charge			32			

AC Characteristics

Symbol	Parameter	Test conditions	Value			Unit	Note
			Min.	Typ.	Max.		
C_{iss}	Input Capacitance	$V_{GS} = 0V, V_{DS} = 600V$ $f = 1\text{ MHz}$ $V_{AC} = 25mV$		721		pF	Fig. 13
C_{oss}	Output Capacitance			60		pF	
C_{rss}	Reverse Transfer Capacitance			4.9		pF	
$R_{G(int)}$	Internal Gate Resistance	$f = 1\text{ MHz}, V_{AC} = 25mV$		3.8		Ω	

Reverse Diode Characteristics

Symbol	Parameter	Test conditions	Value			Unit	Note
			Min.	Typ.	Max.		
V_{SD}	Diode Forward Voltage	$V_{GS} = -4V, I_{SD} = 7.5A$		4.4		V	Fig. 7,8
		$V_{GS} = -4V, I_{SD} = 7.5A, T_J = 175^\circ C$		3.8			
I_S	Continuous Diode Forward Current	$V_{GS} = -4V, T_C = 25^\circ C$		26		A	
$I_{S, pulse}$	Diode pulse Current	$V_{GS} = -4V, \text{pulse width } t_p \text{ limited by } T_{jmax}$		57		A	



Typical Performance

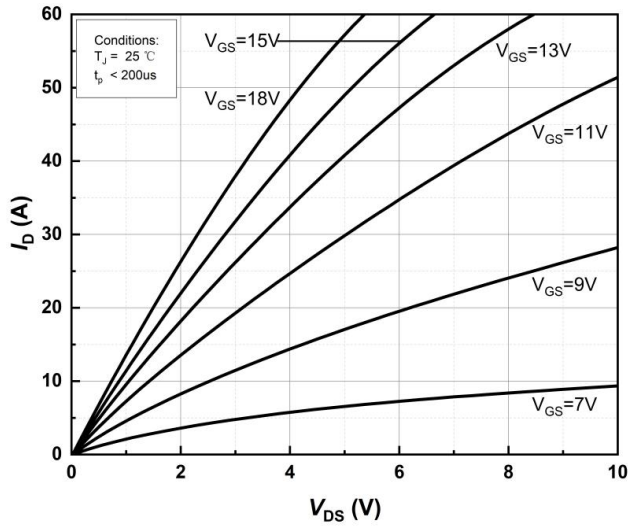


Figure 1. Output characteristics at $T_j=25^\circ\text{C}$

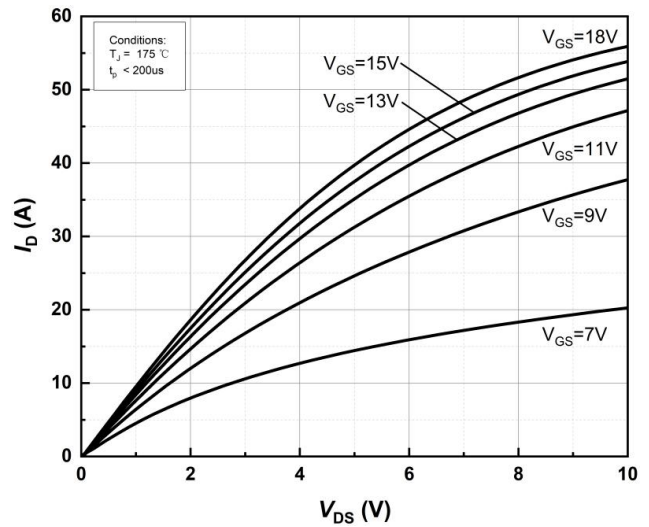


Figure 2. Output characteristics at $T_j=175^\circ\text{C}$

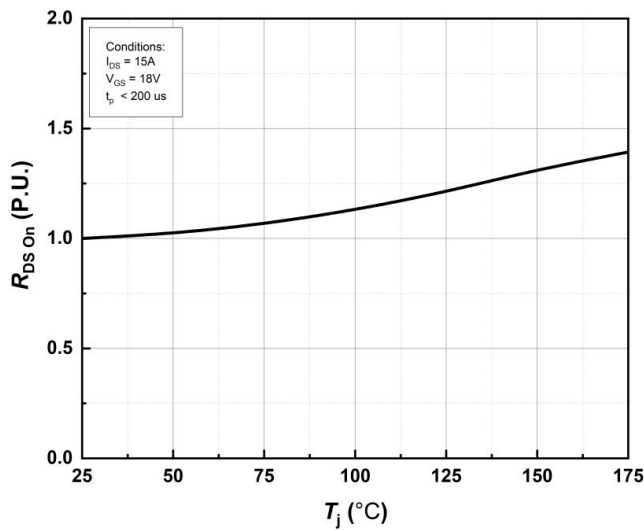


Figure 3. Normalized On-Resistance vs. Temperature

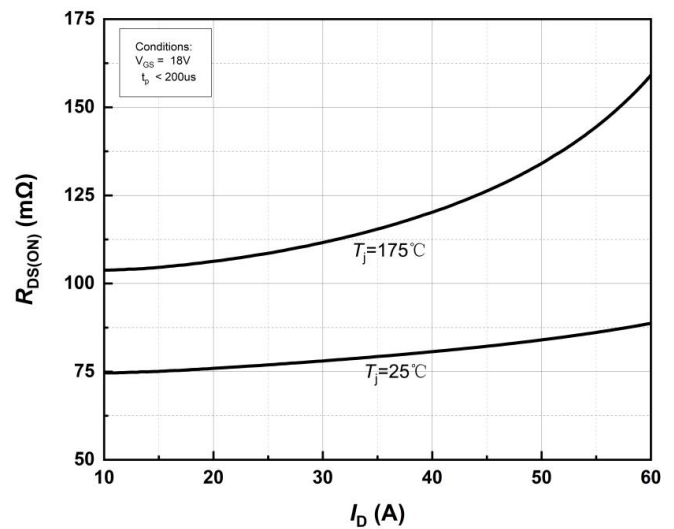


Figure 4. On-Resistance vs. Drain current for Various Temperature

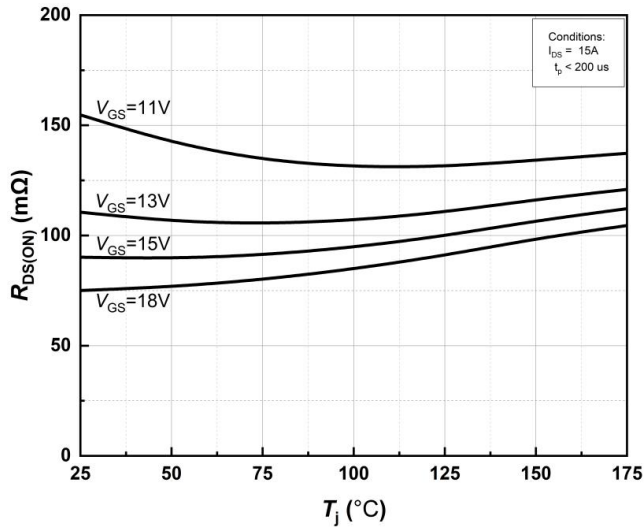


Figure 5. On-Resistance vs. Temperature for Various Gate Voltage

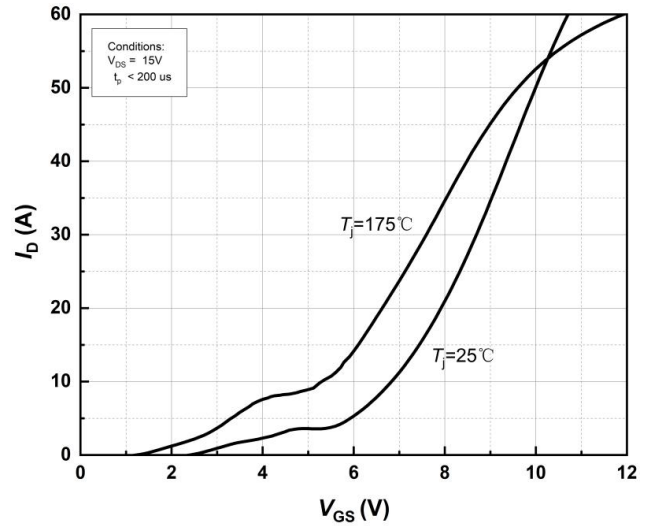


Figure 6. Transfer Characteristics for Various Junction Temperatures

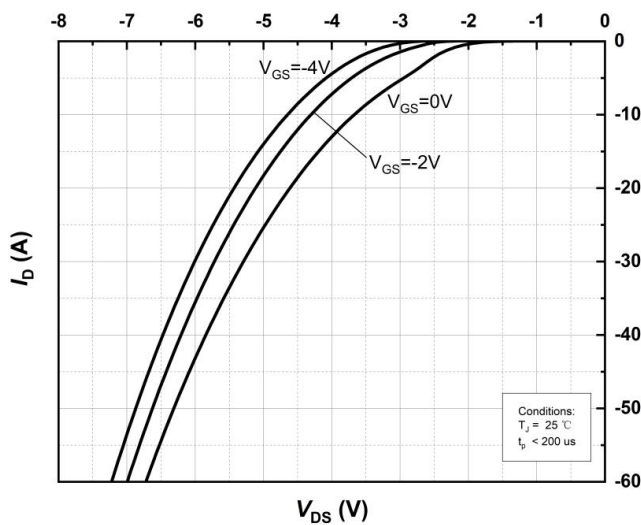


Figure 7. Body Diode Characteristics at $T_j=25^{\circ}C$

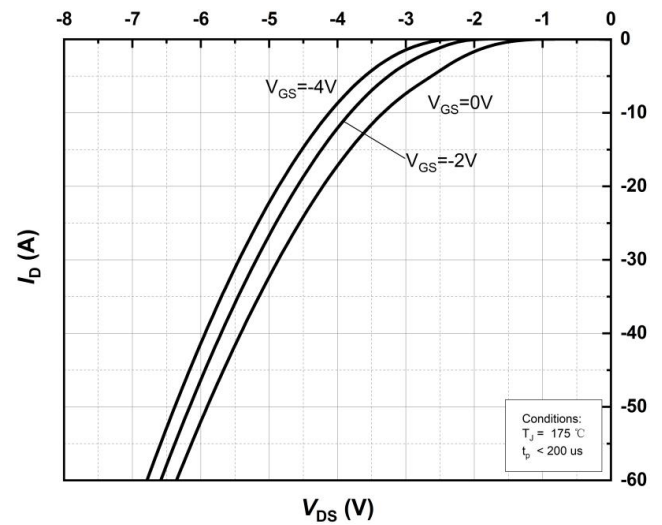


Figure 8. Body Diode Characteristics at $T_j=175^{\circ}C$

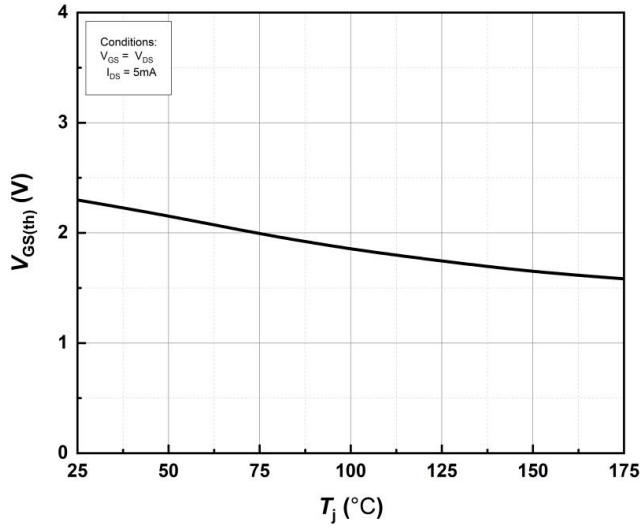


Figure 9. Threshold Voltage vs. Temperature

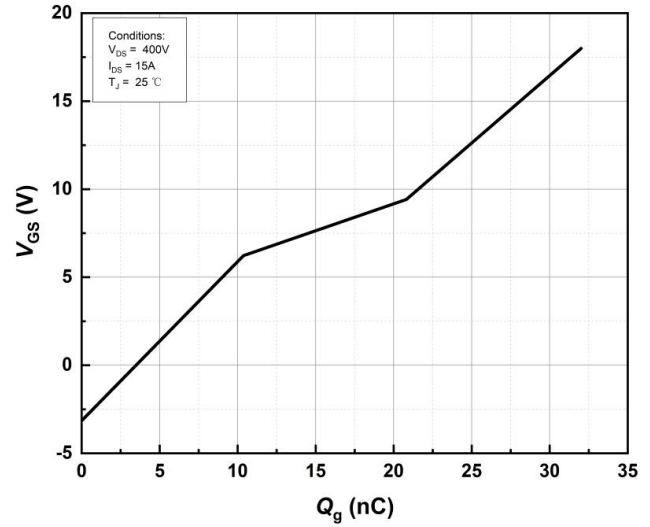


Figure 10 Gate Charge Characteristics

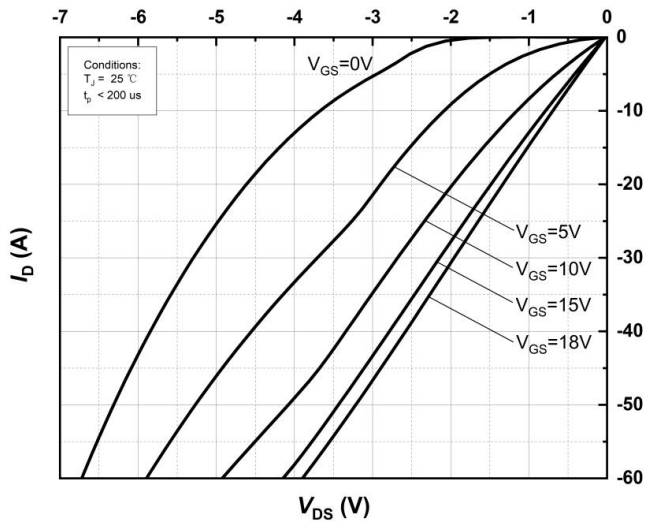


Figure 11. 3rd Quadrant Characteristic at $T_J=25^\circ C$

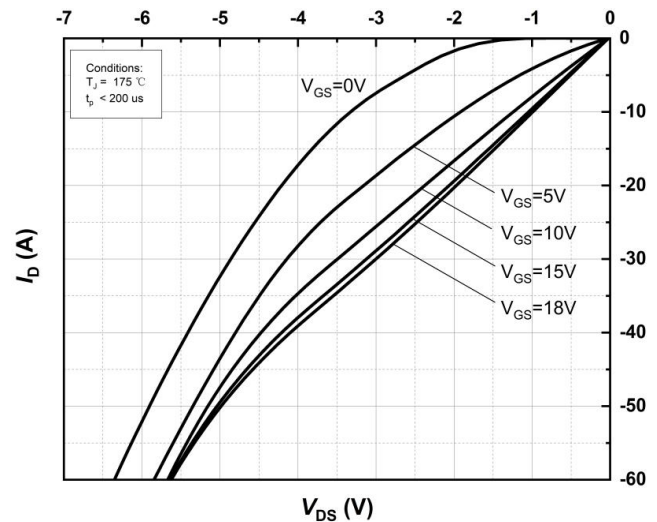


Figure 12. 3rd Quadrant Characteristic at $T_J=175^\circ C$

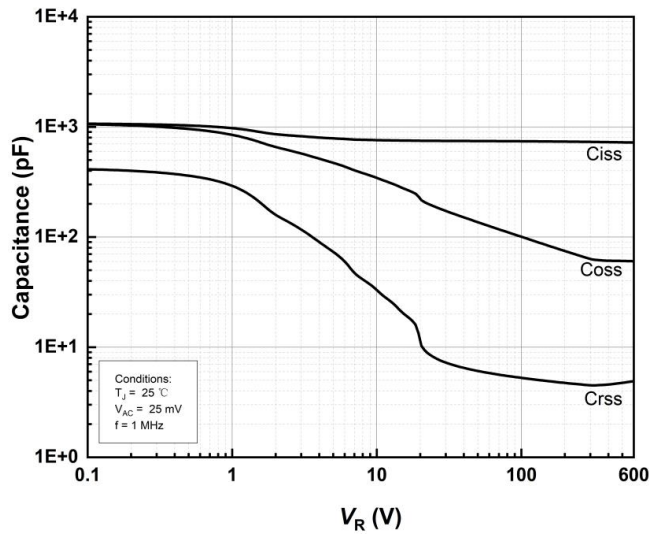


Figure 13. Capacitances vs. Drain-Source Voltage (0 – 600V)

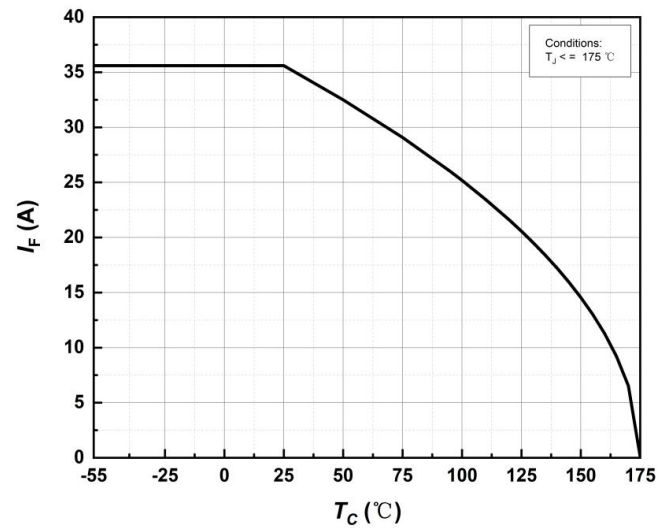


Figure 14. Continuous Drain Current Derating vs Case Temperature

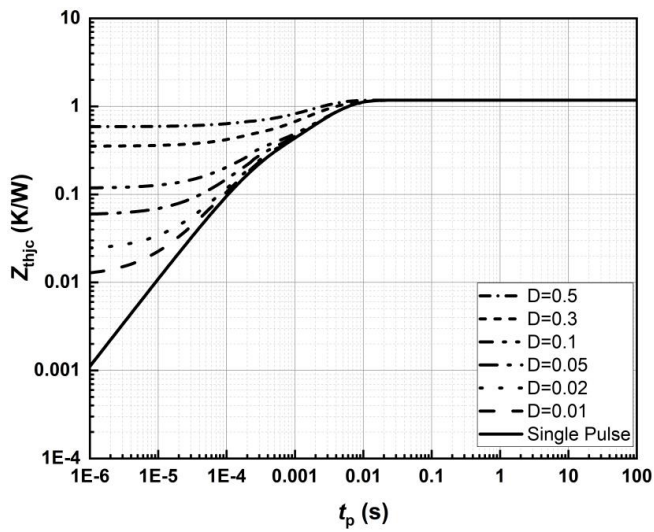


Figure 15. Transient Thermal Impedance (Junction – Case)

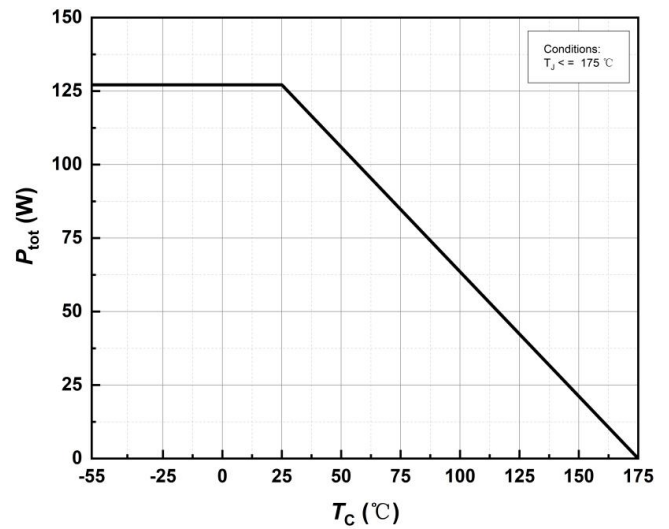


Figure 16. Maximum Power Dissipation Derating vs. Case Temperature

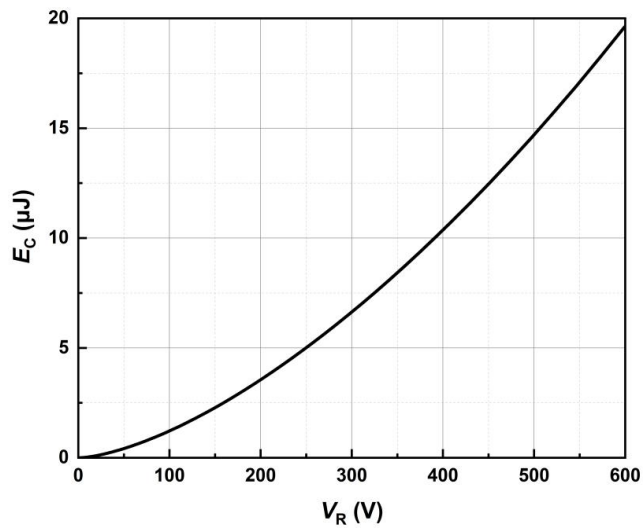


Figure 17. Output Capacitor Stored Energy

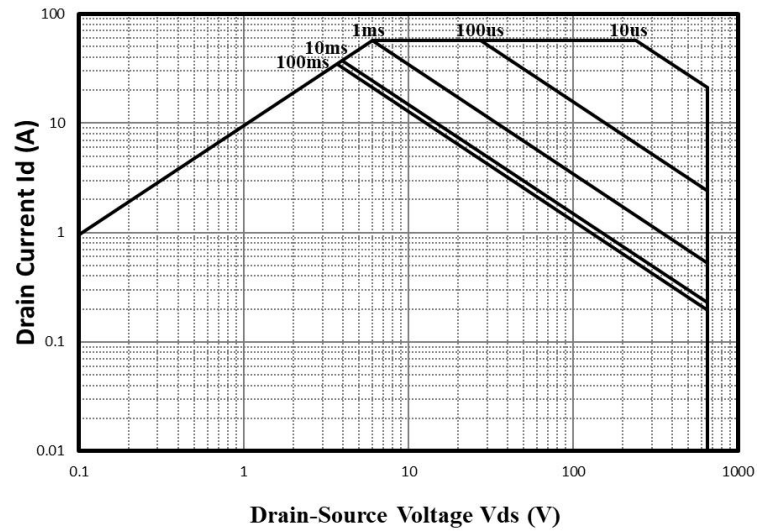
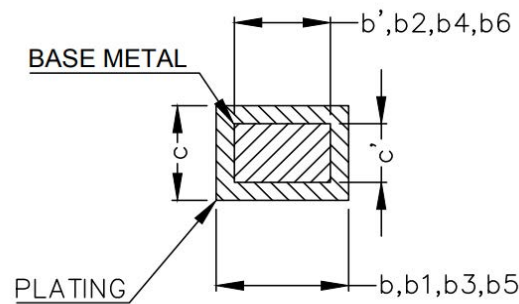
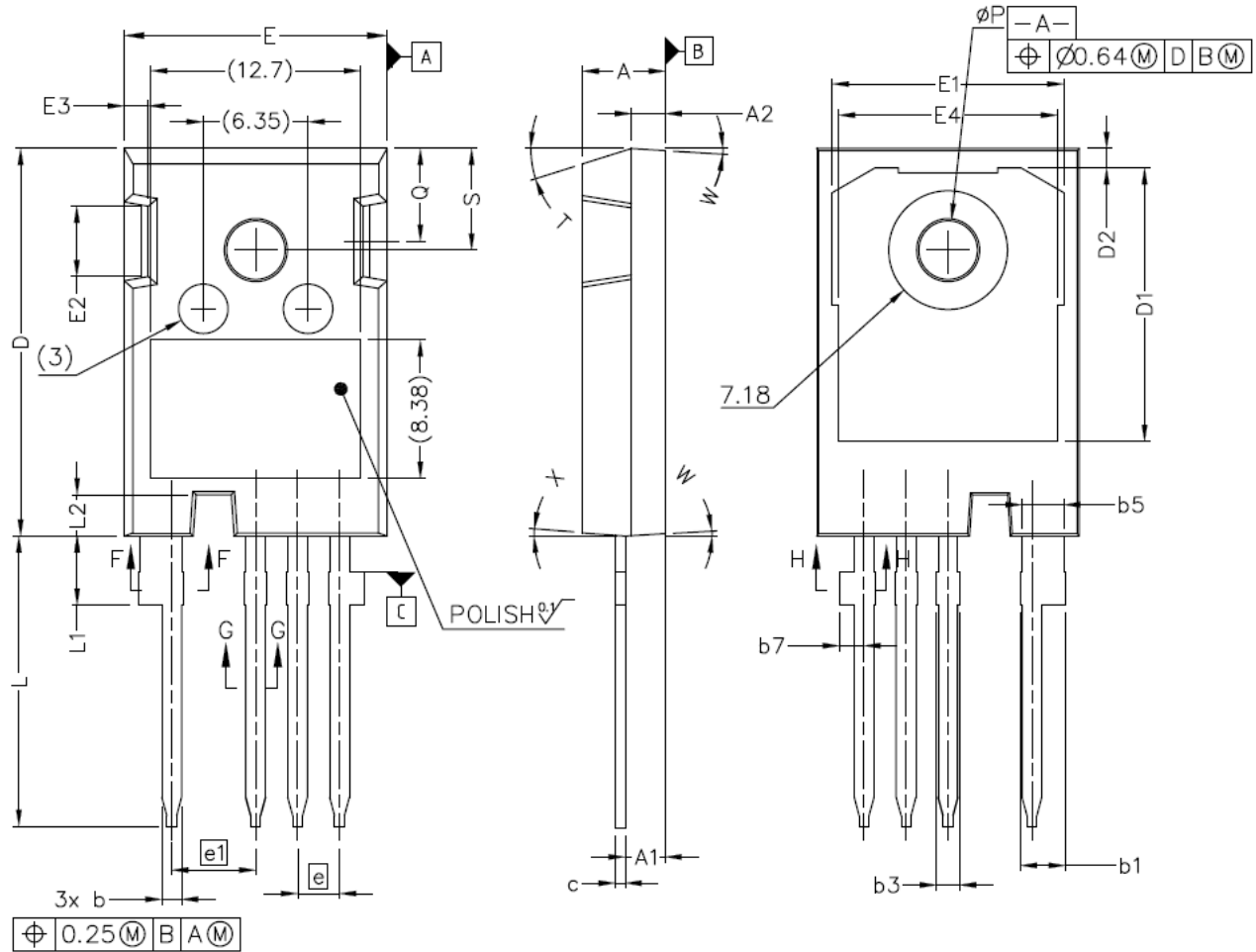


Figure 18. Safe Operating Area



Package Dimensions

Package TO-247H-4L



SECTION "F-F", "G-G" AND "H-H"
SCALE: NONE

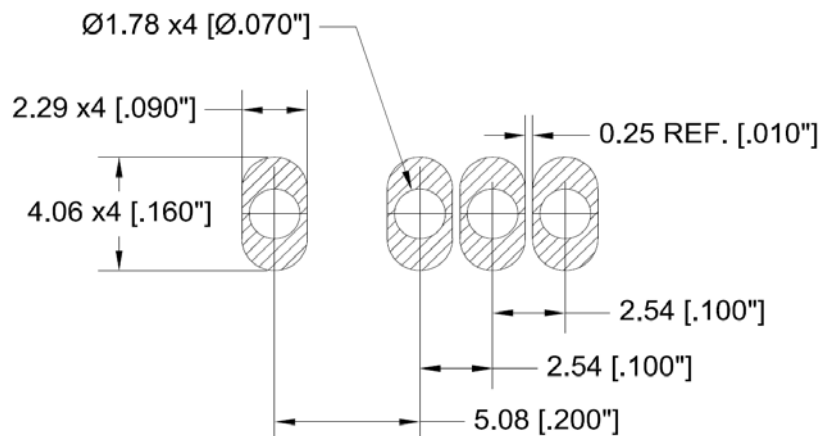


NOTE ;

1. ALL METAL SURFACES: TIN PLATED, EXCEPT AREA OF CUT
2. DIMENSIONING & TOLERANCEING CONFIRM TO
ASME Y14.5M-1994.
3. ALL DIMENSIONS ARE IN MILLIMETERS.
ANGLES ARE IN DEGREES.
4. 'N' IS THE NUMBER OF TERMINAL POSITIONS

SYM	MILLIMETERS	
	MIN	MAX
A	4.83	5.21
A1	2.29	2.54
A2	1.91	2.16
b`	1.07	1.28
b	1.07	1.33
b1	2.39	2.94
b2	2.39	2.84
b3	1.07	1.60
b4	1.07	1.50
b5	2.39	2.69
b6	2.39	2.64
b7	1.30	1.70
c`	0.55	0.65
c	0.55	0.68
D	23.30	23.60
D1	16.25	17.65
D2	0.95	1.25
E	15.75	16.13

SYM	MILLIMETERS	
	MIN	MAX
E1	13.10	14.15
E2	3.68	5.10
E3	1.00	1.90
E4	12.38	13.43
e	2.54 BSC	
e1	5.08 BSC	
N*	4	
L	17.31	17.82
L1	3.97	4.37
L2	2.35	2.65
Ø P	3.51	3.65
Q	5.49	6.00
S	6.04	6.30
T	17.5° REF.	
W	3.5° REF.	
X	4° REF.	





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