



### Features

- High Blocking Voltage with Low On-Resistance
- High Speed Switching with Low Capacitance
- Easy to Parallel and Simple to Drive

### Benefits

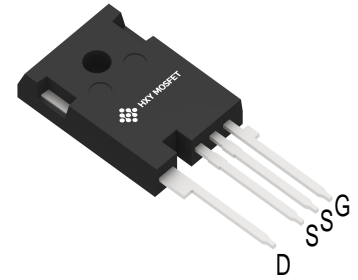
- Higher system efficiency
- Reduce cooling requirements
- Increase power density
- Increase system switching frequency

### Applications

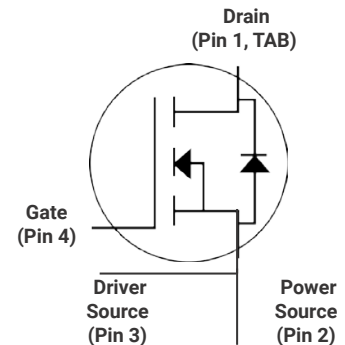
- Renewable Energy
- EV Battery Chargers
- High Voltage DC/DC Converters
- Switch Mode Power Supplies



Ordering Part Number	Package	Marking
HC2M0080120K	TO-247H-4L	HC2M0080120K



TO-247H-4L



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

Symbol	Parameter	Value	Unit	Test Conditions	Note
$V_{DSmax}$	Drain-Source Voltage	1200	V	$V_{GS}=0V, I_D=100\mu A$	
$V_{GSmax}$	Gate-Source Voltage	-10/+25	V	Absolute maximum values	
$V_{GSop}$	Gate-Source Voltage	-5/+20	V	Recommended operational values	
$I_D$	Continuous Drain Current	36	A	$V_{GS}=20V, T_c=25^\circ\text{C}$	Fig. 19
		24		$V_{GS}=20V, T_c=100^\circ\text{C}$	
$I_{D(pulse)}$	Pulsed Drain Current	80	A	Pulse width $t_p$ limited by $T_{Jmax}$	Fig. 22
$P_D$	Power Dissipation	192	W	$T_c=25^\circ\text{C}, T_J=150^\circ\text{C}$	Fig. 20
$T_J, T_{STG}$	Operating Junction and Storage Temperature	-55 to +150	$^\circ\text{C}$		
$T_L$	Solder Temperature, 1.6mm from case for 10s	260	$^\circ\text{C}$		
$M_d$	Mounting Torque, (M3 or 6-32 screw)	1	Nm		
		8.8	lbf-in		



**Electrical Characteristics** ( $T_C = 25^\circ\text{C}$  unless other

Symbol	Parameter	Min.	Typ.	Max.	Unit	Test Conditions	Note
$V_{(BR)DSS}$	Drain-Source Breakdown Voltage	1200	/	/	V	$V_{GS}=0V, I_D=100\mu A$	
$V_{GS(th)}$	Gate Threshold Voltage	2.0	2.4	4.0	V	$V_{DS}=V_{GS}, I_D=5mA$	Fig. 11
		/	1.8	/		$V_{DS}=V_{GS}, I_D=5mA, T_J=150^\circ\text{C}$	
$I_{DSS}$	Zero Gate Voltage Drain Current	/	1	100	$\mu A$	$V_{DS}=1200V, V_{GS}=0V$	
$I_{GSS+}$	Gate-Source Leakage Current	/	10	250	nA	$V_{DS}=0V, V_{GS}=25V$	
$I_{GSS-}$	Gate-Source Leakage Current	/	10	250	nA	$V_{DS}=0V, V_{GS}=-10V$	
$R_{DS(on)}$	Drain-Source On-State Resistance	/	80	98	m $\Omega$	$V_{GS}=20V, I_D=20A$	Fig. 4,5,6
		/	140	/		$V_{GS}=20V, I_D=20A, T_J=150^\circ\text{C}$	
$g_{fs}$	Transconductance	/	11.2	/	S	$V_{DS}=20V, I_{DS}=20A$	Fig. 7
		/	11.3	/		$V_{DS}=20V, I_{DS}=20A, T_J=150^\circ\text{C}$	
$C_{iss}$	Input Capacitance	/	1475	/	pF	$V_{GS}=0V$	Fig. 17,18
$C_{oss}$	Output Capacitance	/	94	/		$V_{DS}=1000V$	
$C_{rss}$	Reverse Transfer Capacitance	/	11	/		$f=1MHz$	
$E_{oss}$	$C_{oss}$ Stored Energy	/	52	/	$\mu J$	$V_{AC}=25mV$	Fig. 16
$E_{ON}$	Turn-On Switching Energy	/	564	/	mJ	$V_{DS}=800V, V_{GS}=-5V/20V$	
$E_{OFF}$	Turn-Off Switching Energy	/	260	/		$I_D=20A, R_{G(ext)}=2.5\Omega, L=200\mu H$	
$t_{d(on)}$	Turn-On Delay Time	/	9.3	/	ns	$V_{DS}=800V, V_{GS}=-5V/20V, I_D=20A$ $R_{G(ext)}=2.5\Omega, R_L=40\Omega$	
$t_r$	Rise Time	/	9.5	/			
$t_{d(off)}$	Turn-Off Delay Time	/	18	/			
$t_f$	Fall Time	/	7.6	/			
$R_{G(int)}$	Internal Gate Resistance	1	3.1	5.5	$\Omega$	$f=1MHz, V_{AC}=25mV$	
$Q_{GS}$	Gate to Source Charge	/	24	/	nC	$V_{DS}=800V$	Fig. 12
$Q_{GD}$	Gate to Drain Charge	/	15	/		$V_{GS}=-5V/20V$	
$Q_G$	Total Gate Charge	/	79	/		$I_D=20A$	

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

Symbol	Parameter	Typ.	Max.	Unit	Test Conditions	Note
$V_{SD}$	Diode Forward Voltage	3.6	/	V	$V_{GS}=-5V, I_{SD}=10A$	Fig. 8,9,10
		3.3	/		$V_{GS}=-5V, I_{SD}=10A, T_J=150^\circ\text{C}$	
$I_S$	Continuous Diode Forward Current	/	44	A	$T_C=25^\circ\text{C}$	
$t_{rr}$	Reverse Recover Time	35	/	ns	$V_R=800V, I_{SD}=20A$	
$Q_{rr}$	Reverse Recovery Charge	91	/	nC		
$I_{rrm}$	Peak Reverse Recovery Current	4.5	/	A		

**Thermal Characteristics**

Symbol	Parameter	Typ.	Max.	Unit	Test Conditions	Note
$R_{\theta JC}$	Thermal Resistance from Junction to Case	0.6	/	$^\circ\text{C/W}$		Fig. 21
$R_{\theta JA}$	Thermal Resistance from Junction to Ambient	/	40			



### Typical Performance

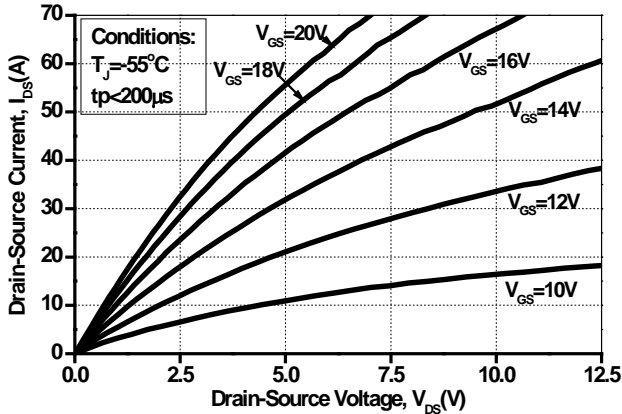


Figure 1. Output Characteristics  $T_J = -55^\circ\text{C}$

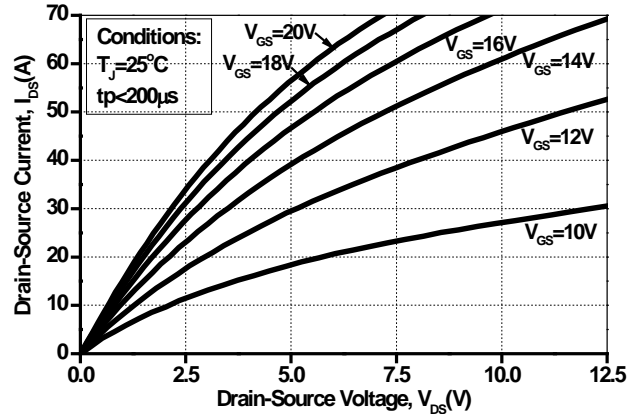


Figure 2. Output Characteristics  $T_J = 25^\circ\text{C}$

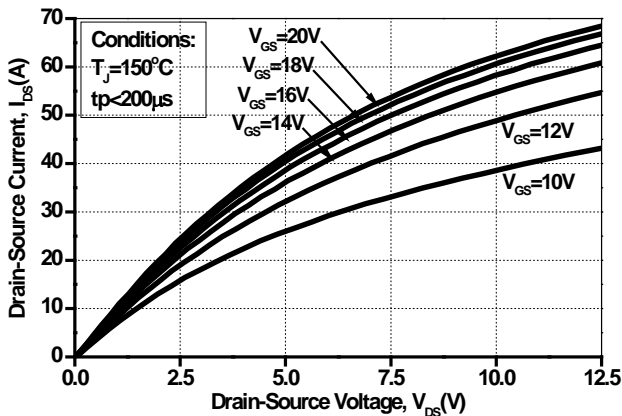


Figure 3. Output Characteristics  $T_J = 150^\circ\text{C}$

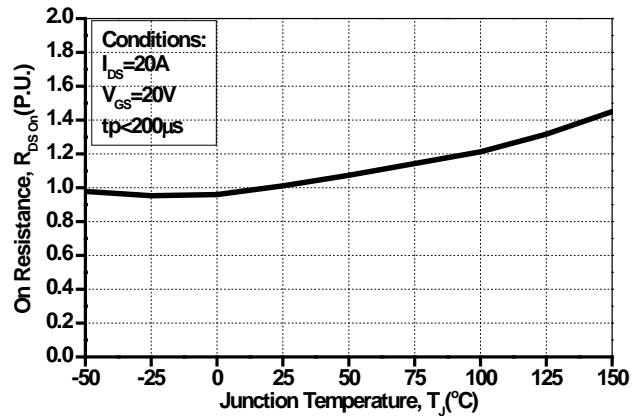


Figure 4. Normalized On-Resistance vs. Temperature

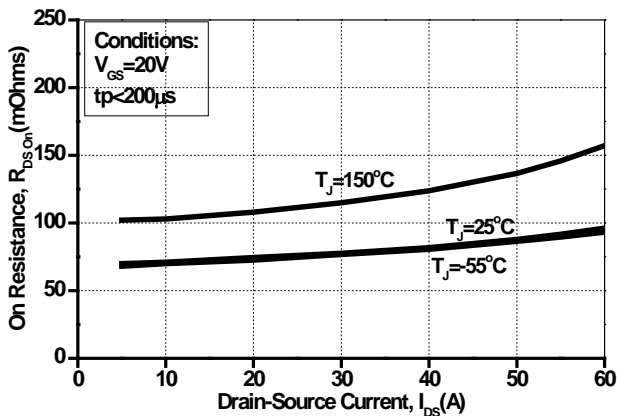


Figure 5. On-Resistance vs. Drain Current  
For Various Temperatures

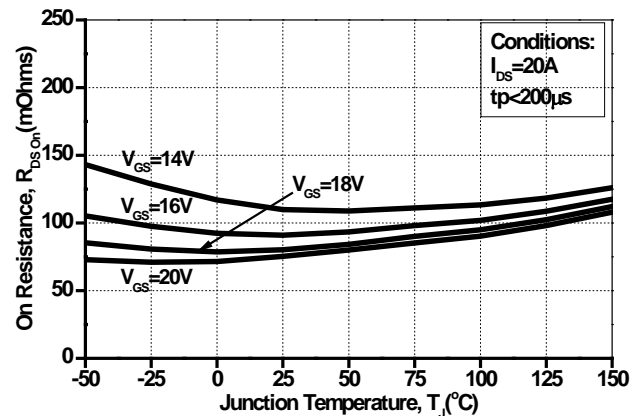


Figure 6. On-Resistance vs. Temperature  
For Various Gate Voltage



### Typical Performance

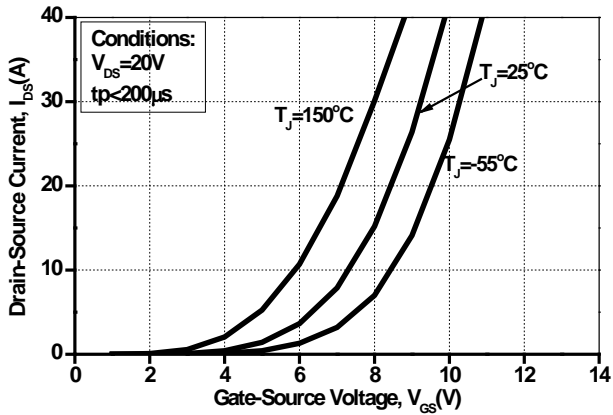


Figure 7. Transfer Characteristic for Various Junction Temperatures

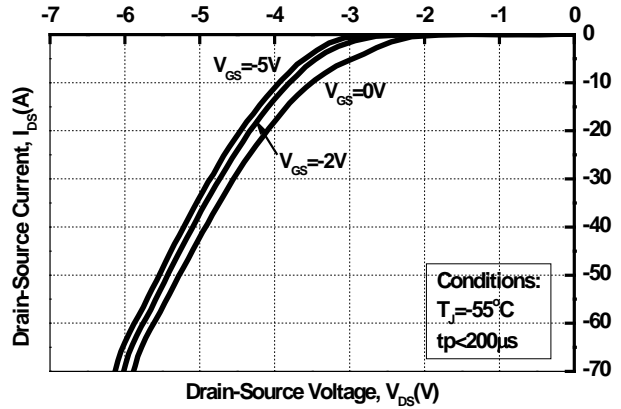


Figure 8. Body Diode Characteristic at -55 °C

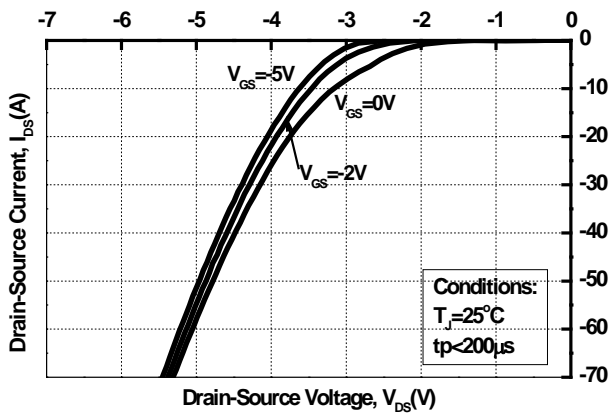


Figure 9. Body Diode Characteristic at 25 °C

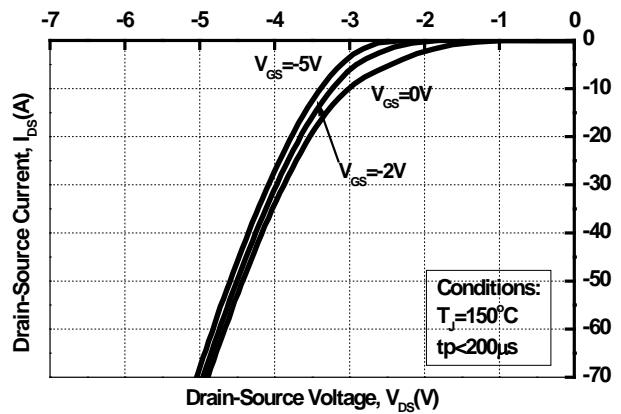


Figure 10. Body Diode Characteristic at 150 °C

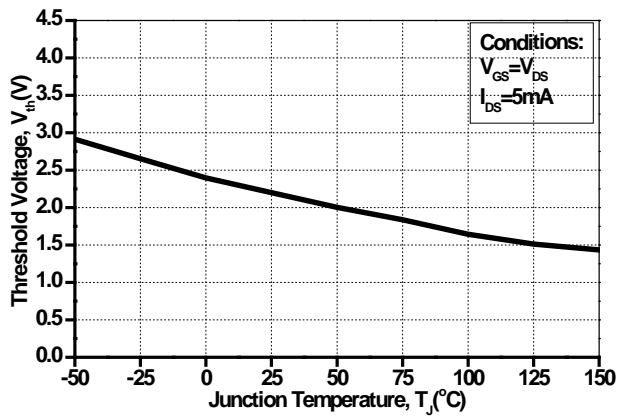


Figure 11. Threshold Voltage vs. Temperature

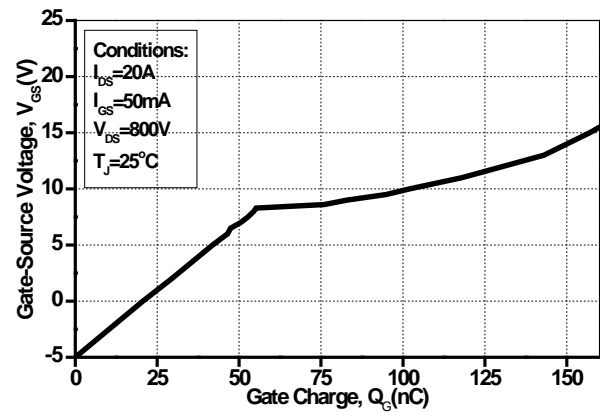


Figure 12. Gate Charge Characteristics



Typical Performance

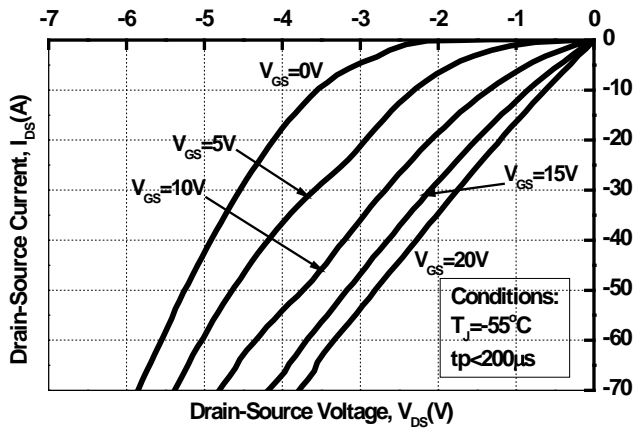


Figure 13. 3rd Quadrant Characteristic at -55 °C

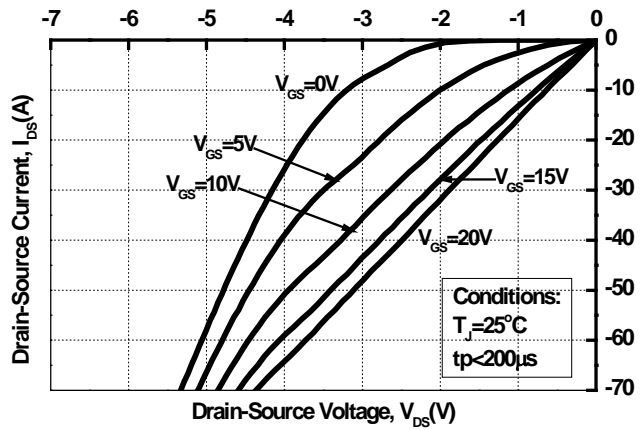


Figure 14. 3rd Quadrant Characteristic at 25 °C

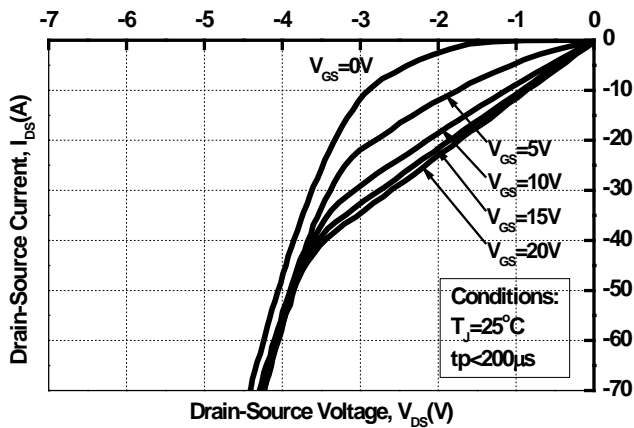


Figure 14. 3rd Quadrant Characteristic at 150 °C

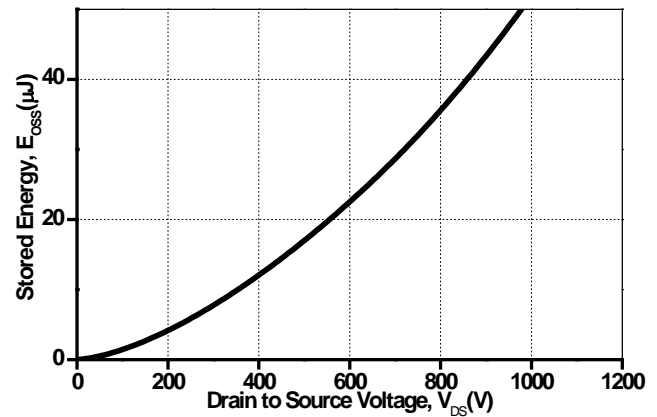


Figure 16. Output Capacitor Stored Energy

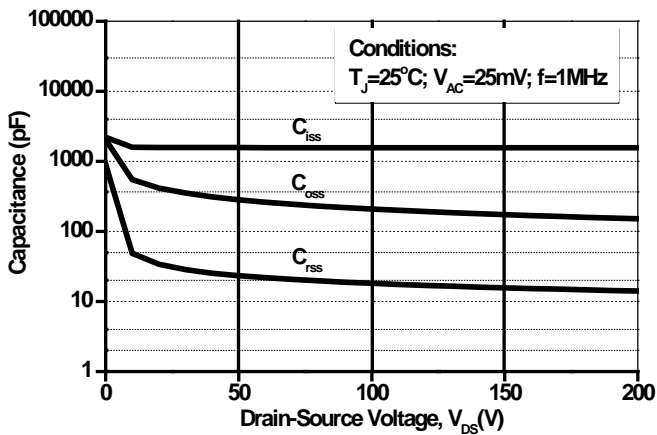


Figure 17. Capacitances vs. Drain-Source Voltage (0 - 200V)

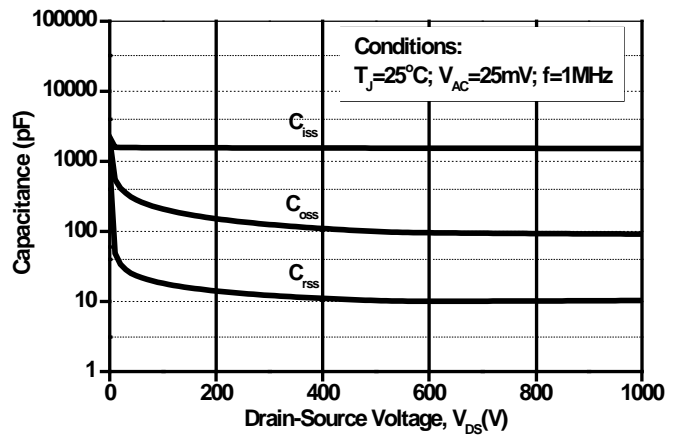


Figure 18. Capacitances vs. Drain-Source Voltage (0 - 1000V)



### Typical Performance

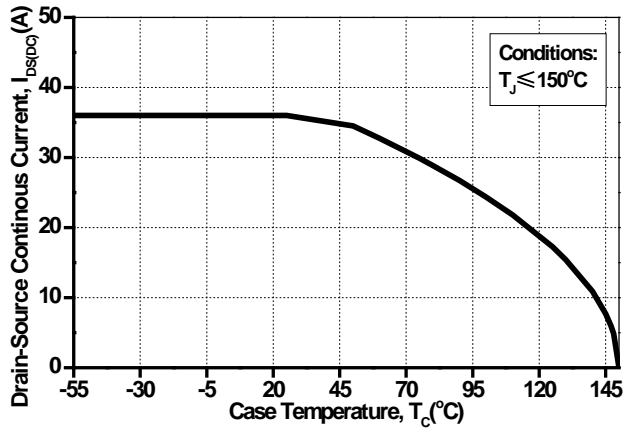


Figure 19. Continuous Drain Current Derating vs. Case Temperature

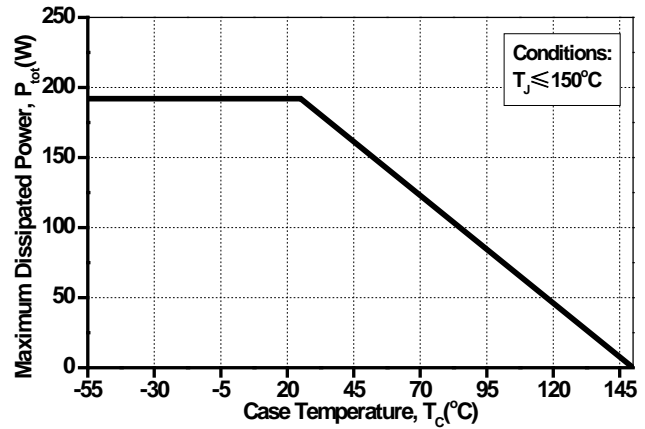


Figure 20. Maximum Power Dissipation Derating vs. Case Temperature

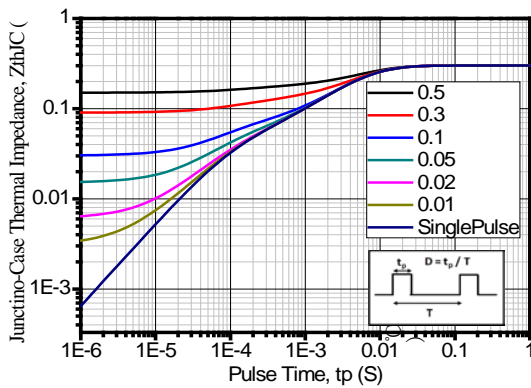


Figure 21. Transient Thermal Impedance (Junction - Case)

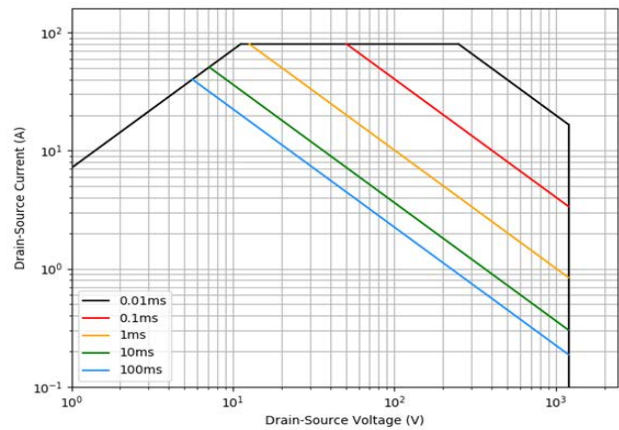


Figure 22. Safe Operating Area



### Test Circuit Schematic

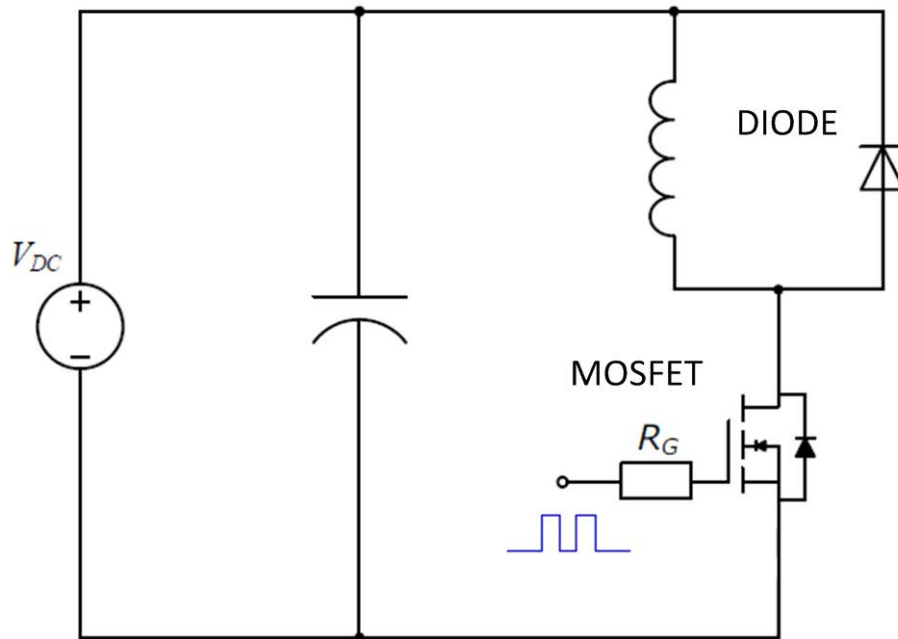
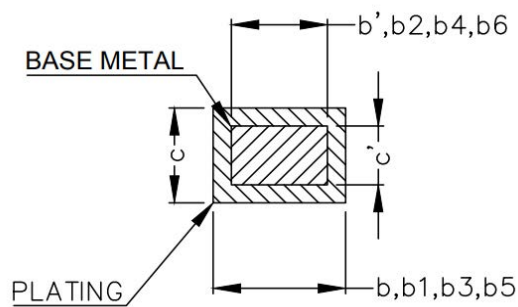
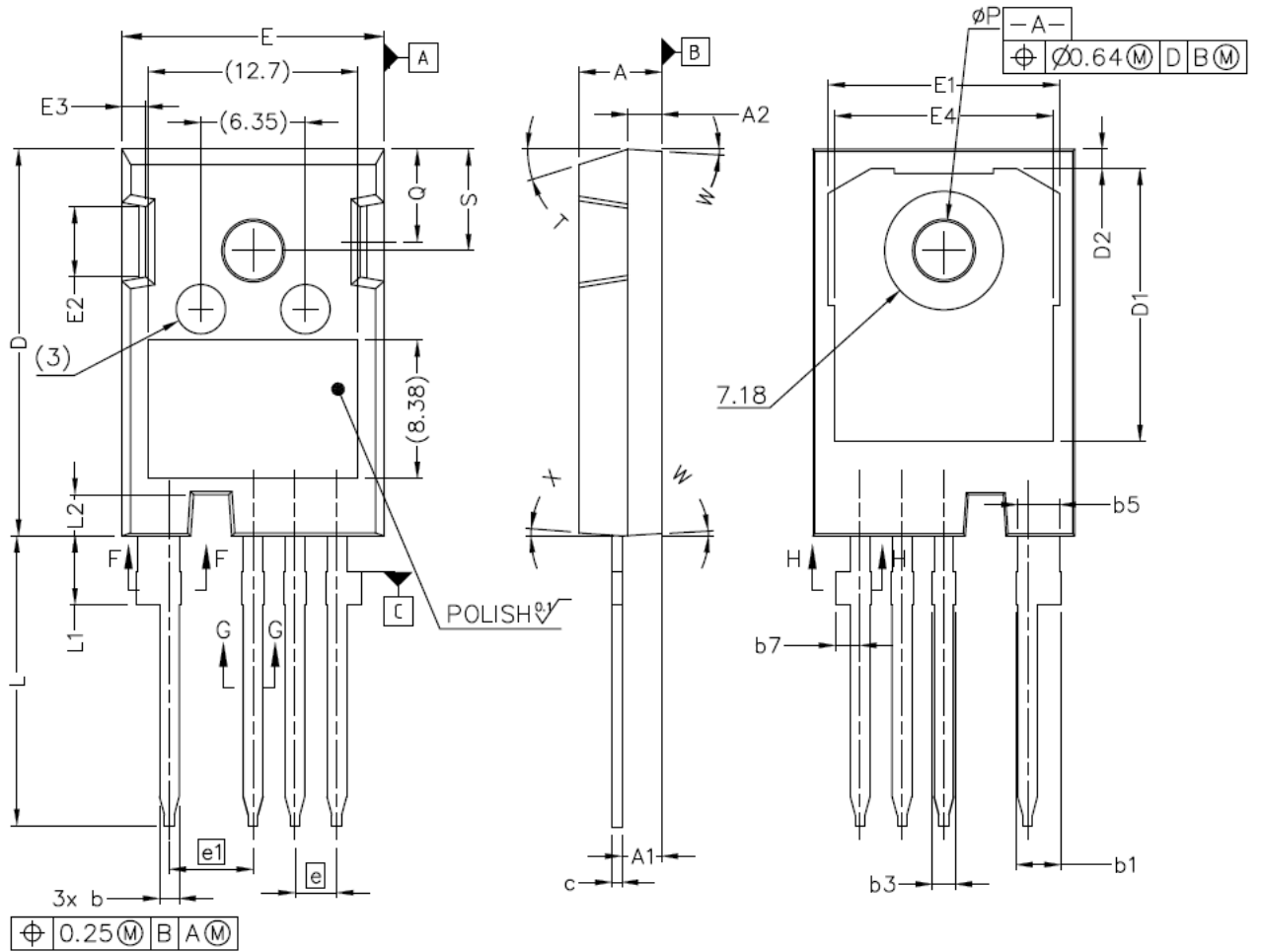


Figure 23. Clamped Inductive Switching  
Waveform Test Circuit



Package Dimensions

Package TO-247H-4L



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



**Package Dimensions**

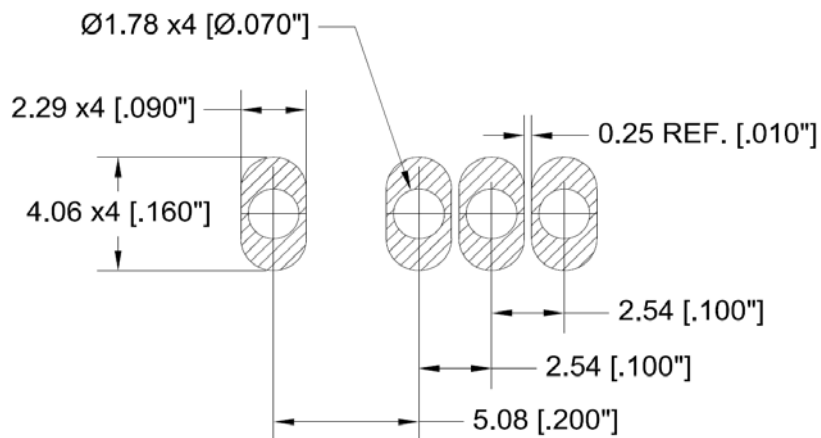
Package TO-247H-4L

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
∅ 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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