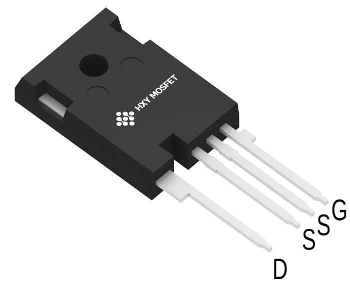
Features

- 3rd generation SiC MOSFET technology
- Optimized package with separate driver source pin
- High blocking voltage with low on-resistance
- High-speed switching with low capacitances
- Fast intrinsic diode with low reverse recovery (Q_{rr})
- Halogen free, RoHS compliant



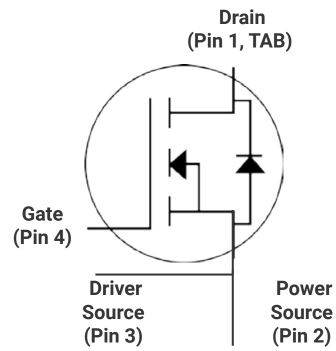
TO-247H-4L

Benefits

- Reduce switching losses and minimize gate ringing
- 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
C2M0040120K	TO-247H-4L	C2M0040120K

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

Symbol	Parameter	Value	Unit	Test Conditions
V_{DSmax}	Drain - Source Voltage	1200	V	V_{GS} = 0 V, I_D = 100 μA
V_{GSmax}	Gate - Source Voltage (dynamic)	-10/+25	V	AC (f >1 Hz)
V_{GSop}	Gate - Source Voltage (static)	-5/+20	V	Static
I_D	Continuous Drain Current	78	A	V_{GS} = 15 V, T_C = 25˚C
		57		V_{GS} = 15 V, T_C = 100˚C
$I_{D(pulse)}$	Pulsed Drain Current	TBD	A	Pulse width t_P limited by T_{jmax}
P_D	Power Dissipation	405	W	T_C=25˚C, T_J = 175 ˚C
T_J , T_{stg}	Operating Junction and Storage Temperature	-40 to +175	˚C	
T_L	Solder Temperature	260	˚C	1.6mm (0.063”) from case for 10s

Electrical Characteristics (T_C = 25˚C unless otherwise specified)

Symbol	Parameter	Min.	Typ.	Max.	Unit	Test Conditions	Note
$V_{(BR)DSS}$	Drain-Source Breakdown Voltage	1200			V	V_{GS} = 0 V, I_D = 100 μA	
$V_{GS(th)}$	Gate Threshold Voltage	2.0	2.5	4.0	V	V_{DS} = V_{GS}, I_D = 10 mA	Fig. 11
			1.5		V	V_{DS} = V_{GS}, I_D = 10 mA, T_J = 175°C	
I_{DSS}	Zero Gate Voltage Drain Current		1	50	μA	V_{DS} = 1200 V, V_{GS} = 0 V	
I_{GSS}	Gate-Source Leakage Current		10	200	nA	V_{GS} = 20 V, V_{DS} = 0 V	
		-200	-10		nA	V_{GS} = -10 V, V_{DS} = 0 V	
$R_{DS(on)}$	Drain-Source On-State Resistance		40	50	mΩ	V_{GS} = 20 V, I_D = 40 A	Fig. 4, 5, 6
			59			V_{GS} = 20 V, I_D = 40 A, T_J = 175°C	
g_{fs}	Transconductance		10.4		S	V_{DS}= 20 V, I_{DS}= 40 A	Fig. 7
			7.7			V_{DS}= 20 V, I_{DS}= 40 A, T_J = 175°C	
C_{iss}	Input Capacitance		2101		pF	V_{GS} = 0 V, V_{DS} = 1000 V f = 100 kHz V_{AC} = 25 mV	Fig. 17, 18
C_{oss}	Output Capacitance		161				
C_{rss}	Reverse Transfer Capacitance		14				
E_{oss}	C_{oss} Stored Energy		90		μJ		Fig. 16
E_{ON}	Turn-On Switching Energy (SiC Diode FWD)		1100		μJ	V_{DS} = 800 V, V_{GS} = -5 V/+20 V, I_D = 40 A, $R_{G(ext)}$ = 2.5Ω, L= 100 μH, Tj = 175°C	Fig. 26
E_{OFF}	Turn Off Switching Energy (SiC Diode FWD)		900				
$t_{d(on)}$	Turn-On Delay Time		22		ns	V_{DD} = 800 V, V_{GS} = -5 V/20 V $R_{G(ext)}$ = 2.5 Ω, I_D = 40 A Timing relative to V_{DS}	Fig. 27
t_r	Rise Time		49				
$t_{d(off)}$	Turn-Off Delay Time		71				
t_f	Fall Time		23				
$R_{G(int)}$	Internal Gate Resistance		1.7		Ω	f = 1 MHz, V_{AC} = 25 mV	
Q_{gs}	Gate to Source Charge		33		nC	V_{DS} = 800 V, V_{GS} = -5 V/20 V I_D = 40 A	Fig. 12
Q_{gd}	Gate to Drain Charge		51				
Q_g	Total Gate Charge		131				

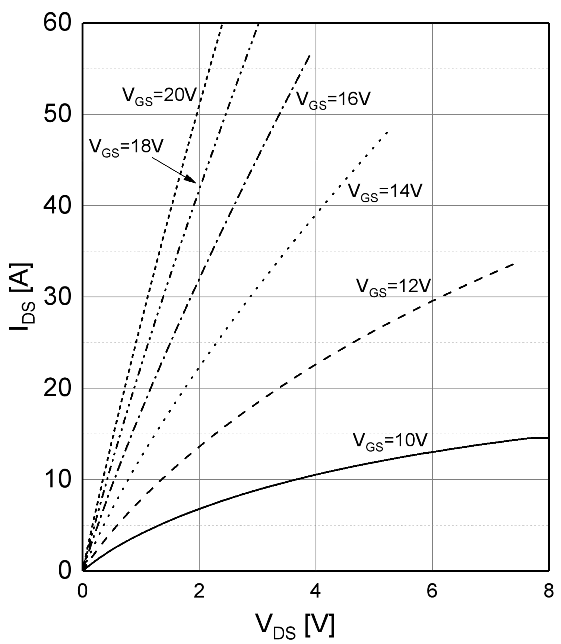
Reverse Diode Characteristics (T_C = 25˚C unless otherwise specified)

Symbol	Parameter	Typ.	Max.	Unit	Test Conditions	Note
V_{SD}	Diode Forward Voltage	4.1		V	V_{GS} = -5 V, I_{SD} = 20 A, T_J = 25 °C	Fig. 8, 9, 10
		3.5		V	V_{GS} = -5 V, I_{SD} = 20 A, T_J = 175 °C	
I_S	Continuous Diode Forward Current		83	A	V_{GS} = -4 V, T_C = 25˚C	Note 1
$I_{S, pulse}$	Diode pulse Current		TBD	A	V_{GS} = -4 V, pulse width t_P limited by T_{jmax}	Note 1
t_{rr}	Reverse Recover time	56		ns	V_{GS} = -5 V, I_{SD} = 40 A, V_R = 800 V dif/dt = 2250 A/μs, T_J = 175 °C	Note 1
Q_{rr}	Reverse Recovery Charge	508		nC		
I_{rrm}	Peak Reverse Recovery Current	18		A		

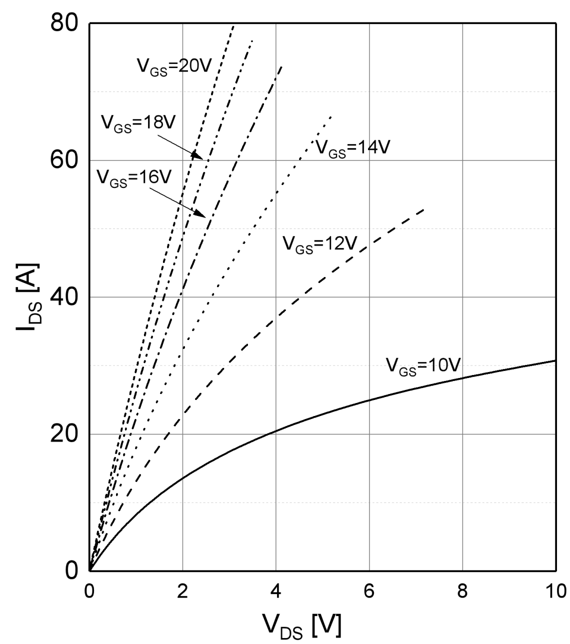
Thermal Characteristics

Symbol	Parameter	Typ.	Unit	Test Conditions	Note
$R_{\theta JC}$	Thermal Resistance from Junction to Case	0.25	°C/W		Fig. 21
$R_{\theta JA}$	Thermal Resistance From Junction to Ambient	40			

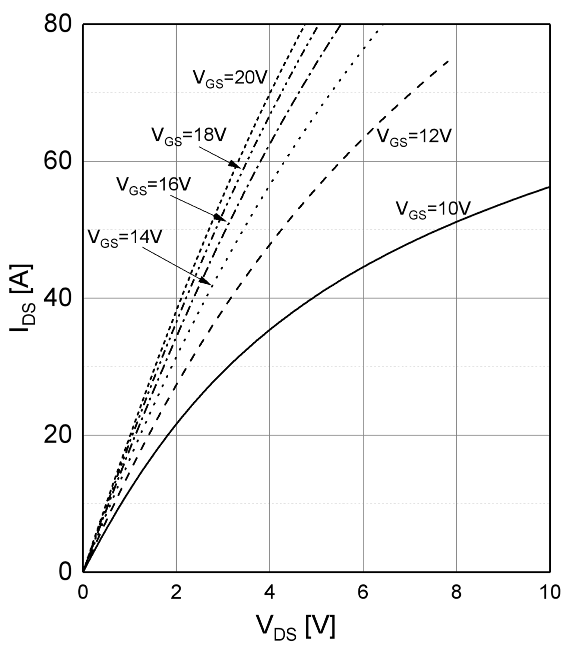
Output characteristics
$I_{DS}=f(V_{DS})$, T_J=-55℃



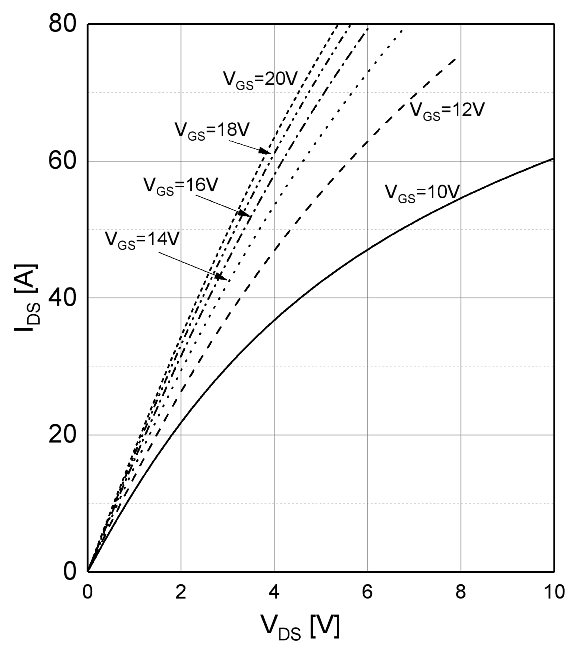
Output characteristics
$I_{DS}=f(V_{DS})$, T_J=25℃



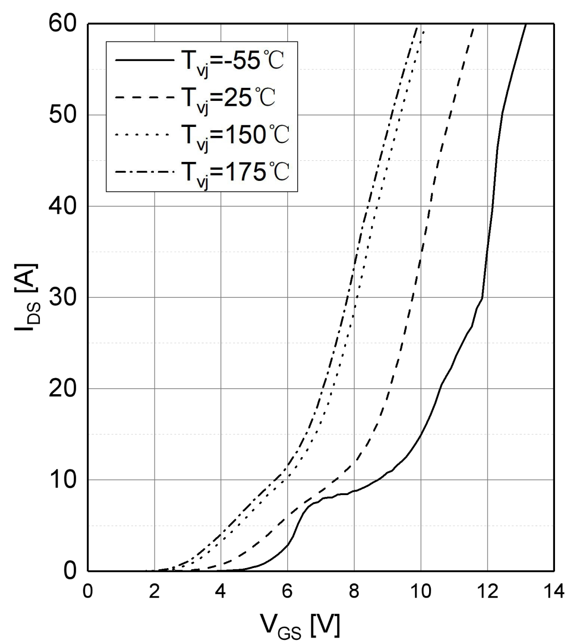
Output characteristics
$I_{DS}=f(V_{DS})$, T_J=150℃



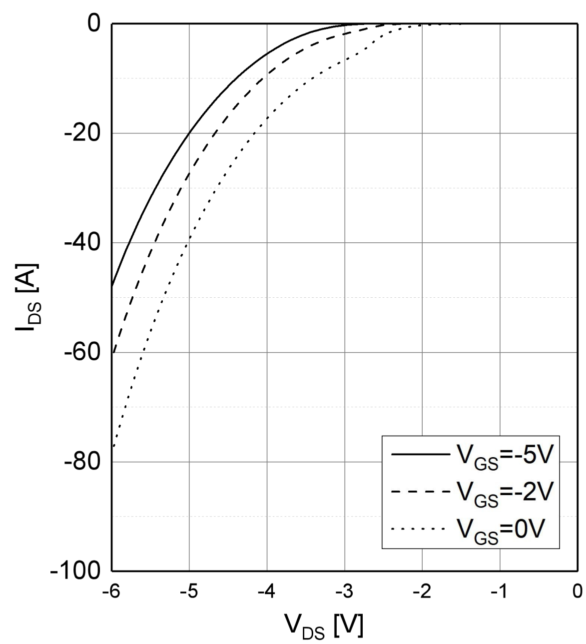
Output characteristics
$I_{DS}=f(V_{DS})$, T_J=175℃



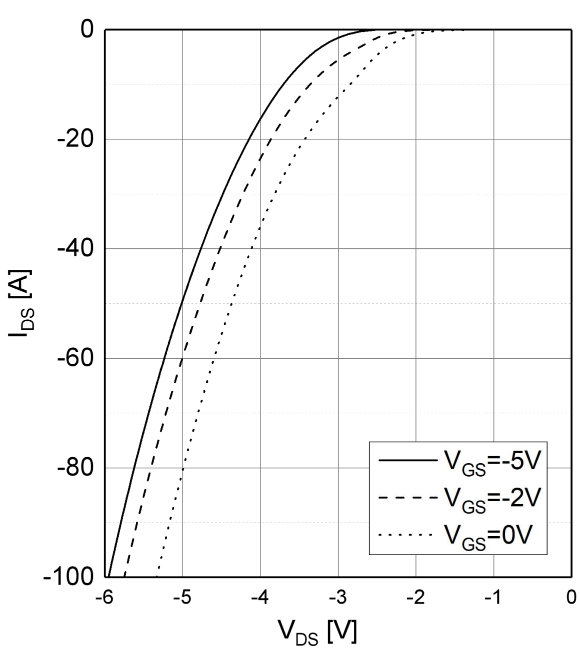
Transfer Characteristics
$I_{DS}=f(V_{GS})$, $V_{DS}=20V$



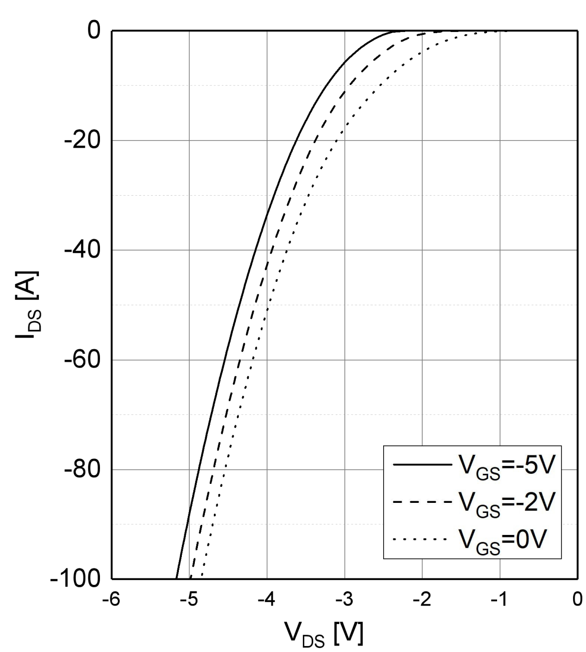
Body Diode Characteristics
$I_{DS}=f(V_{DS})$, T_J=-55℃



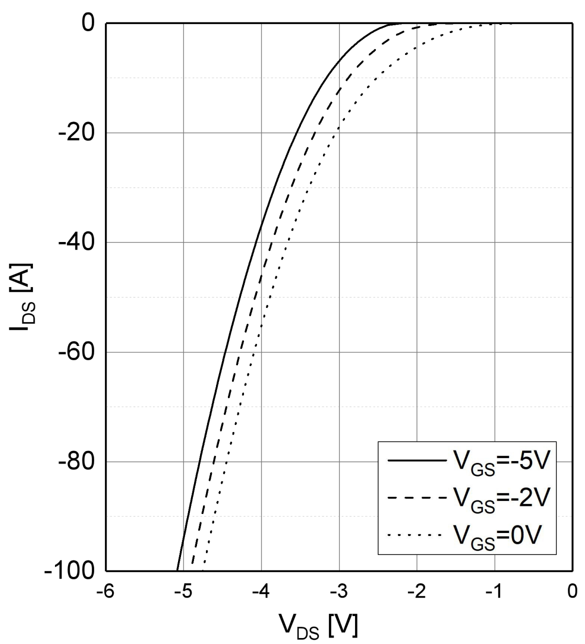
Body Diode Characteristics
$I_{DS}=f(V_{DS})$, T_J=25℃



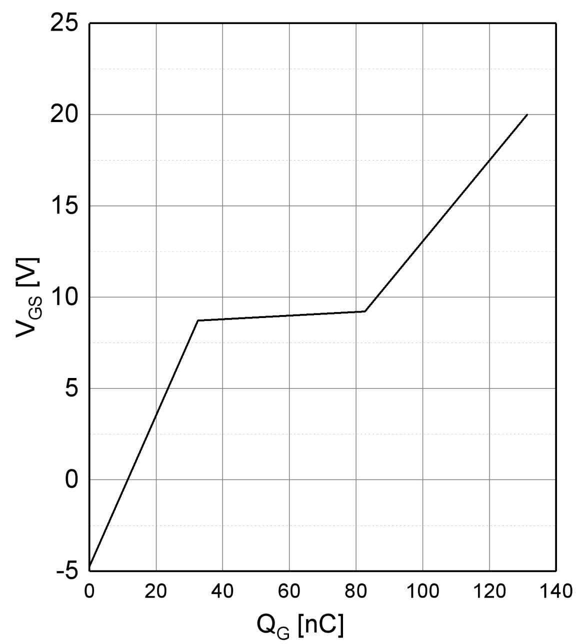
Body Diode Characteristics
$I_{DS}=f(V_{DS})$, T_J=150℃



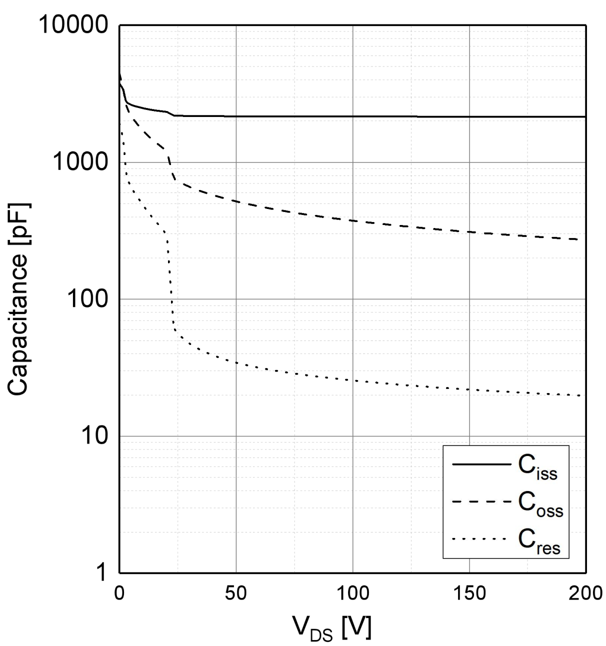
Body Diode Characteristics
$I_{DS}=f(V_{DS})$, T_J=175℃



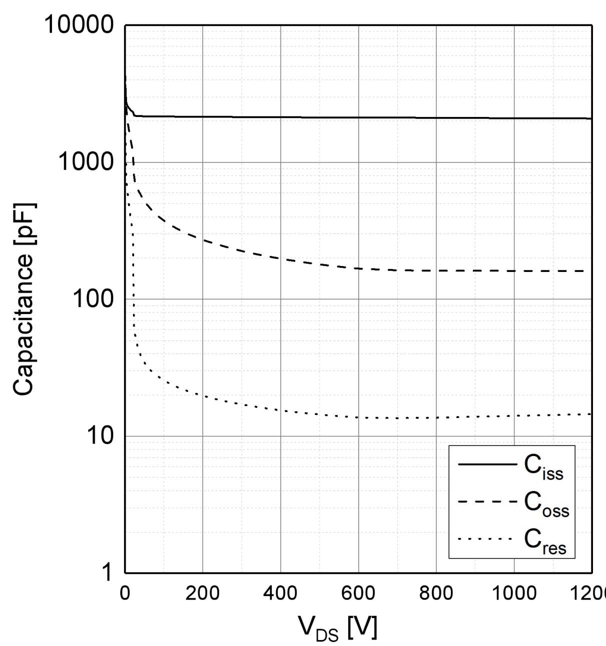
Gate Charge Characteristics
$V_{GS}=f(Q_G)$, I_{DS}=40A, V_{DS}=800V, T_J=25℃



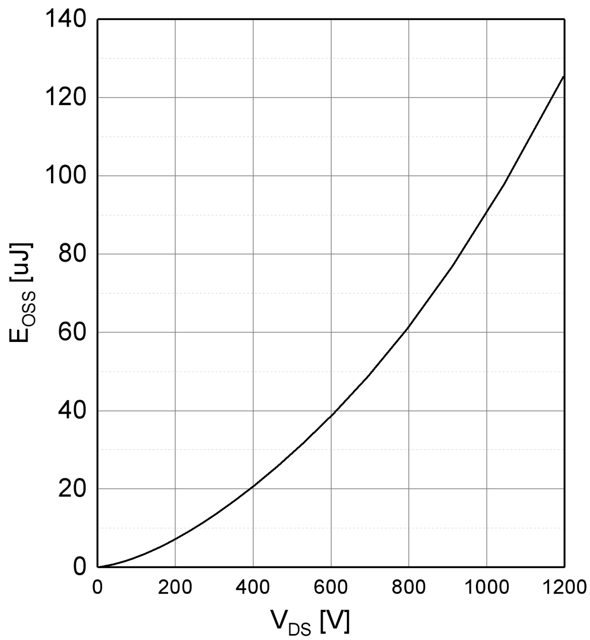
Capacitances vs Drain-Source Voltage (0-200V)
$C=f(V_{DS})$, T_J=25℃, V_{AC}=25mV, f=100KHz



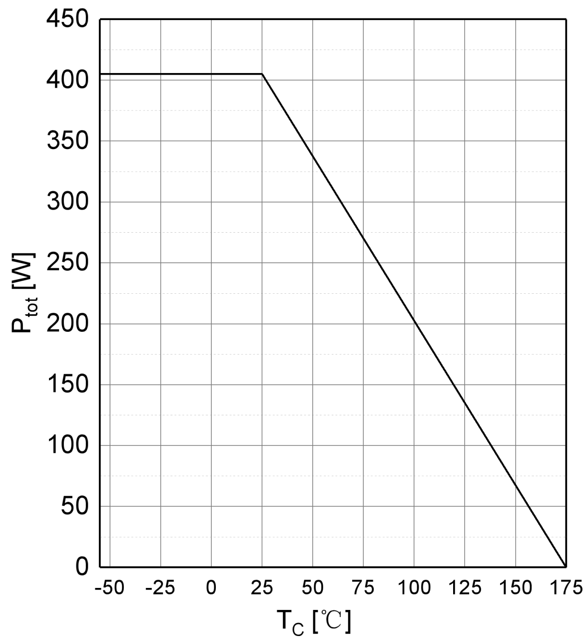
Capacitances vs Drain-Source Voltage (0-1200V)
$C=f(V_{DS})$, T_J=25℃, V_{AC}=25mV, f=100KHz



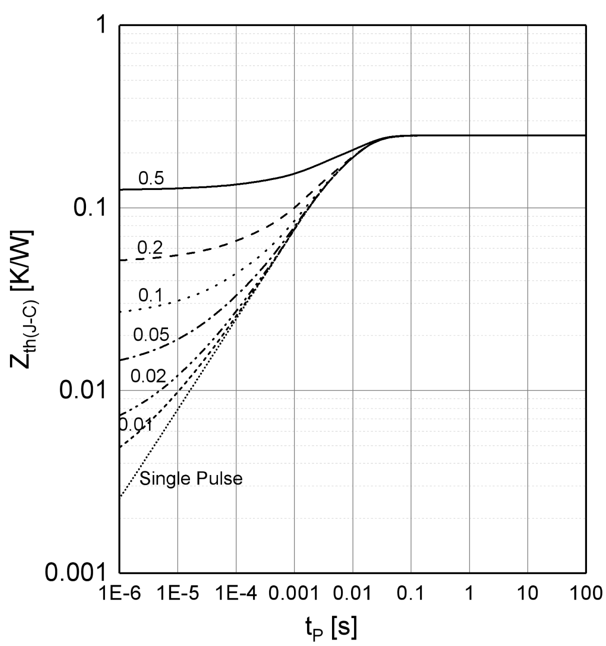
Output Capacitor Stored Energy
E_{OSS} =f(V_{DS}), T_J=25℃



Maximum Power Dissipation Derating
P_{tot} =f(T_C), T_J≤175℃

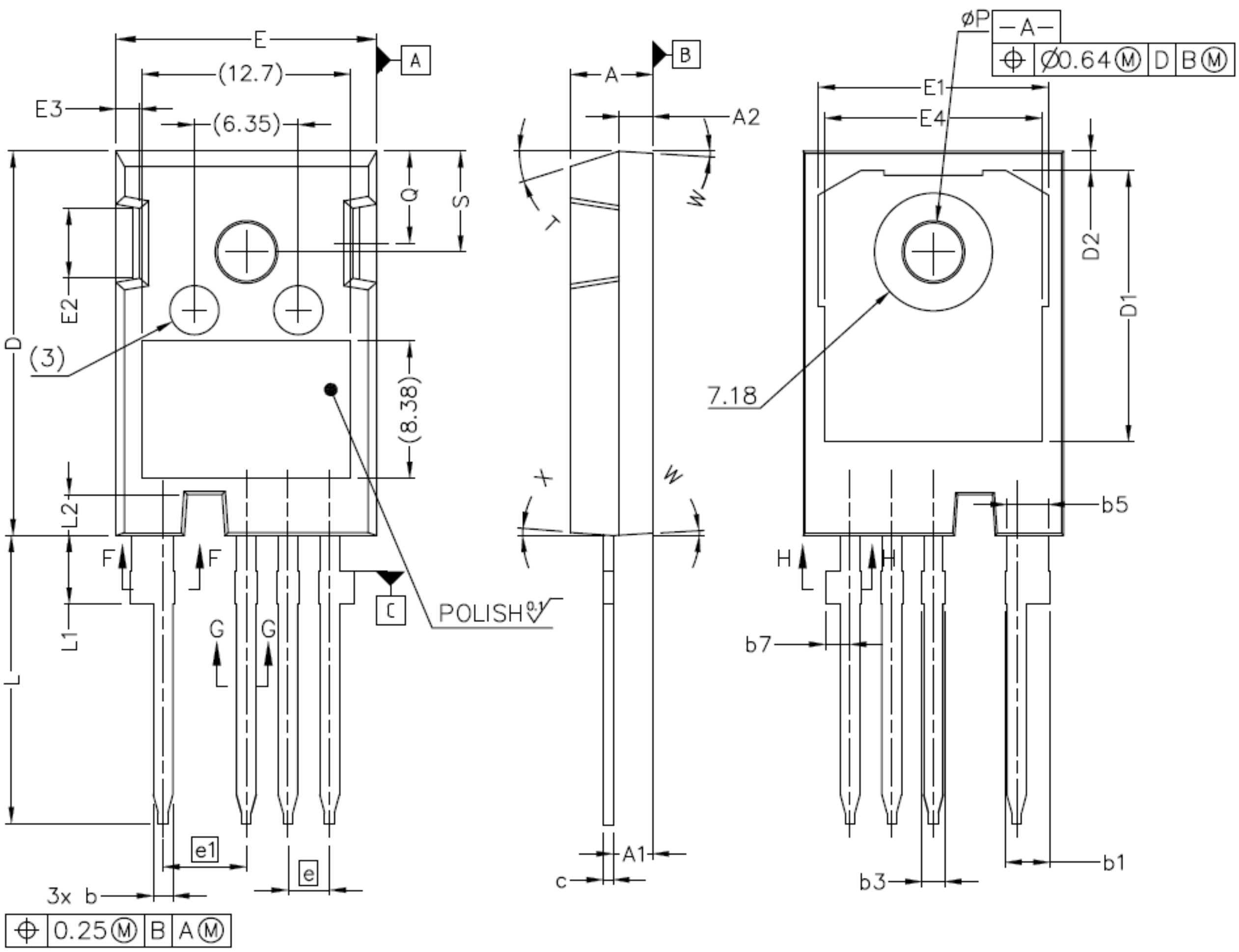


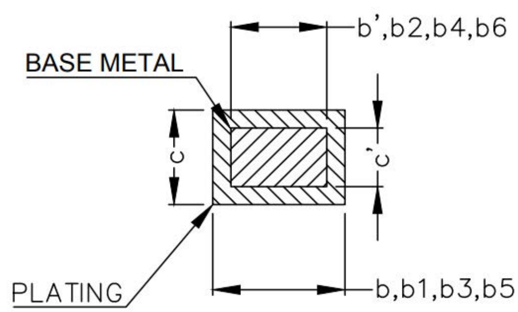
Transient Thermal Impedance (Junction to Case)
$Z_{th(J-C)}$=f(t), T_C=25℃



Package Dimensions

Package TO-247H-4L





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

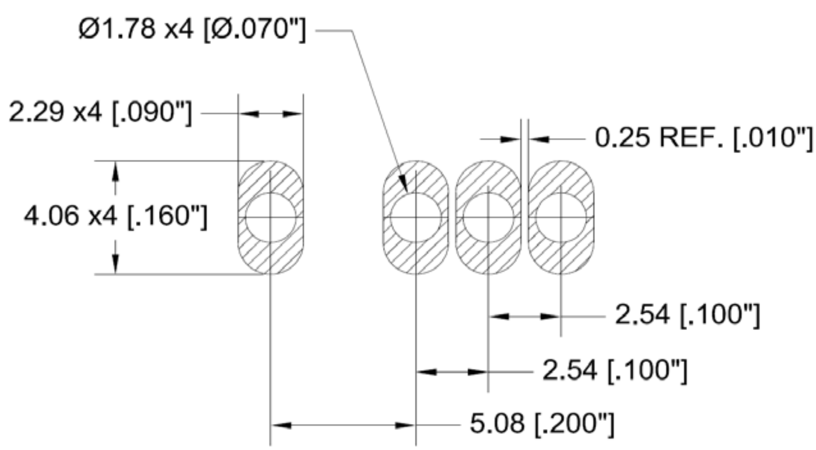
Package Dimensions

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
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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