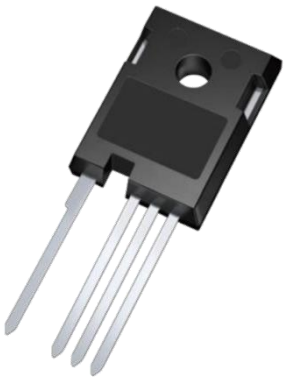


B2M008075HK

750V ▲ 8mΩ ▲ 146A ▲ SIC MOSFET

SILICON CARBIDE SiC MOSFET ▲ THT type
N-channel enhancement mode
Low on-resistance and capacitance
TO-247-4L package with Kelvin Source connection
Avalanche ruggedness
Elimination of voltage drops over the source inductance

SPECIFICATION

Item (T_C = 25°C, unless otherwise noted)		Characteristics
Operating Temperature Range	T_J	-55°C to +150°C
Storage Temperature Range	T_S	-55°C to +150°C
Drain-Source Voltage	$V_{DS\ MAX}$	750V
Continuous Drain Current	I_D	146A
Drain-Source On-State Resistance Note 1	$R_{DS(ON)TYP}$	8mΩ
Reverse Transfer Capacitance Note 2	C_{RSS}	10pF
Power Dissipation	P_D	118W

Notes

1: V_{GS} = 18V, I_D = 94A

2: V_{DS} = 500V, V_{GS} = 0V, f = 100kHz, V_{AC} = 25mV

APPLICATIONS

EV Charging	Industrial Inverters	Motors & Drives	Power Factor Correction	Renewable Energy	SMPS	UPS

PIN DESCRIPTION

Circuit Diagram	Outline ▪ Front View	Pin No.	Symbol	Description
		1	D	Drain
		2	S	Source
		3	KS	Kelvin Source
		4	G	Gate

ABSOLUT MAXIMUM RATINGS ▲ T_C = 25°C, unless otherwise noted

Item	Condition	Symbol		Unit
Drain-Source Breakdown Voltage	V_{GS} = 0V, I_{DS} = 1mA	$V_{DS\ MAX}$	750	V
Continuous Drain Current	V_{GS} = 18V, T_C = 25°C	I_D	146	A
Continuous Drain Current	V_{GS} = 18V, T_C = 100°C	I_D	92	A
Pulse Drain Current	Pulse with t_p limited by $T_{J\ MAX}$	$I_{D,\ pulse}$	382	A
Gate Source Voltage		$V_{GS,\ MAX}$	-6/+23	V
Recommended Gate Source Voltage		$V_{GS,\ op}$	0/+15 to +18	V
Operating Junction Temperature		T_J	-55 to +150	°C
Storage Temperature Range		T_{STG}	-55 to +150	°C

ELECTRICAL CHARACTERISTICS ▲ T_J = 25°C, unless otherwise noted

Item	Condition	Symbol	Min.	Typ.	Max.	Unit
Static Characteristics						
Drain-Source Breakdown Voltage	V_{GS} = 0V, I_D = 100μA	$V_{(BR)DSS}$	750			V
Gate-Source Threshold Voltage	V_{GS} = V_{DS}, I_D = 50mA	$V_{GS(th)}$		3.8		V
Gate-Source Threshold Voltage	V_{GS} = V_{DS}, I_{DS} = 50mA, T_J = 150°C	$V_{GS(th)}$		3.2		V
Zero Gate Voltage Drain Current	V_{DS} = 750V, V_{GS} = 0V	I_{DSS}		1	80	μA
Zero Gate Voltage Drain Current	V_{DS} = 750V, V_{GS} = 0V, T_J = 150°C	I_{DSS}		10		μA
Gate-Source Leakage Current	V_{GS} = 21V, V_{DS} = 0V	I_{GSS}			100	nA
Drain-Source On-State Resistance	V_{GS} = 18V, I_D = 94A	$R_{DS(ON)}$		8	10	mΩ
Drain-Source On-State Resistance	V_{GS} = 18V, I_D = 94A, T_J = 150°C	$R_{DS(ON)}$		16.2		mΩ

Item	Condition	Symbol	Min.	Typ.	Max.	Unit
Dynamic Characteristics						
Input Capacitance	V_{DS} = 500V, V_{GS} = 0V, f = 100kHz, V_{AC} = 25mV	C_{ISS}		7450		pF
Output Capacitance	V_{DS} = 500V, V_{GS} = 0V, f = 100kHz, V_{AC} = 25mV	C_{OSS}		320		pF
Reverse Transfer Capacitance	V_{DS} = 500V, V_{GS} = 0V, f = 100kHz, V_{AC} = 25mV	C_{RSS}		10		pF
Internal Gate Resistance	f = 1MHz, V_{AC} = 25mV	$R_{G(INT.)}$		4.5		Ω
Turn-On Delay Time	V_{DS} = 500V, V_{GS} = 0/+18V, I_D = 94A, $R_{G(ext)}$ = 0Ω, $L_δ$ = 65.1nH, Inductive Load	$t_{D(ON)}$		17.4		ns
Rise Time	V_{DS} = 500V, V_{GS} = 0/+18V, I_D = 94A, $R_{G(ext)}$ = 0Ω, $L_δ$ = 65.1nH, Inductive Load	t_R		23		ns
Turn-Off Delay Time	V_{DS} = 500V, V_{GS} = 0/+18V, I_D = 94A, $R_{G(ext)}$ = 0Ω, $L_δ$ = 65.1nH, Inductive Load	$t_{D(OFF)}$		103		ns
Fall Time	V_{DS} = 500V, V_{GS} = 0/+18V, I_D = 94A, $R_{G(ext)}$ = 0Ω, $L_δ$ = 65.1nH, Inductive Load	t_F		24		ns
Turn-on Switching Energy	V_{DS} = 500V, V_{GS} = 0/+18V, I_D = 94A, $R_{G(ext)}$ = 0Ω, $L_δ$ = 65.1nH, Inductive Load	E_{ON}		828		μJ
Turn-off Switching Energy	V_{DS} = 500V, V_{GS} = 0/+18V, I_D = 94A, $R_{G(ext)}$ = 0Ω, $L_δ$ = 65.1nH, Inductive Load	E_{OFF}		628		μJ

BUILT-IN SiC DIODE CHARACTERISTICS ▲ T_J = 25°C, unless otherwise noted

Item	Condition	Symbol	Min.	Typ.	Max.	Unit
Source-Drain Diode						
Inverse Diode Forward Voltage	V_{GS} = 0V, I_{SD} = 94A	V_{SD}		3.4		V
Reverse Recovery Time	V_{GS} = 0V, I_{SD} = 94A, V_{DS} = 500V, -di/dt = -4000A/µs	t_{RR}		21		ns
Reverse Recovery Charge	V_{GS} = 0V, I_{SD} = 94A, V_{DS} = 500V, -di/dt = -4000A/µs	Q_{RR}		390		nC
Peak Reverse Recovery Current	V_{GS} = 0V, I_{SD} = 94A, V_{DS} = -500V, -di/dt = 4000A/µs	I_{RRM}		32		A

GATE CHARGE CHARACTERISTICS ▲ T_J = 25°C, unless otherwise noted

Item	Condition	Symbol	Min.	Typ.	Max.	Unit
Gate to Source Charge	V_{DS} = 500V, V_{GS} = 0/+18V, I_D = 94A	Q_{GS}		55		nC
Gate to Drain Charge	V_{DS} = 500V, V_{GS} = 0/+18V, I_D = 94A	Q_{GD}		68		nC
Total Gate Charge	V_{DS} = 500V, V_{GS} = 0/+18V, I_D = 94A	Q_G		264		nC

THERMAL RESISTANCE PERFORMANCE

Item	Symbol	Min.	Typ.	Max.	Unit
Thermal Resistance, Junction to Case	$R_{\theta,JC}$		0.48		K/W
Thermal Resistance, Junction to Ambient	$R_{\theta,JA}$		36.59		K/W

REFERENCE DATA ▲ TYPICAL DEVICE PERFORMANCE

Fig. 1 ▪ Forward Output Characteristics I_{DS} vs. V_{DS}, T_J = 25°C

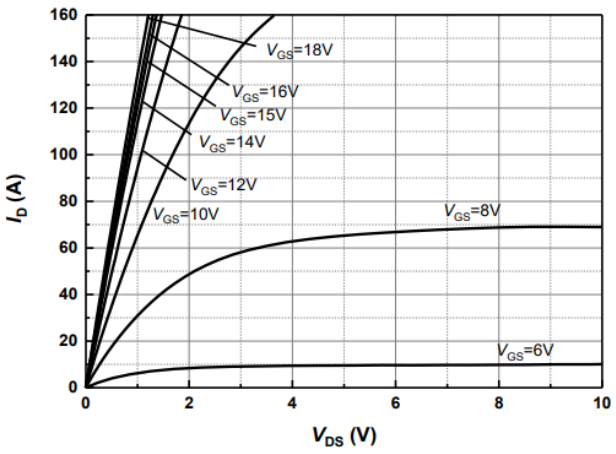


Fig. 2 ▪ Forward Output Characteristics I_{DS} vs. V_{DS}, T_J = 150°C

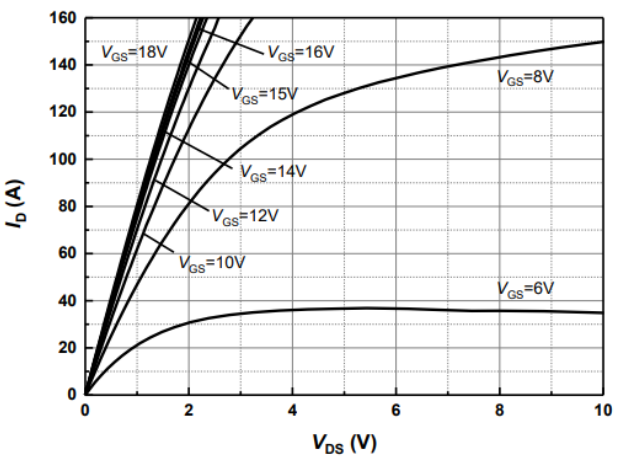


Fig. 3 ▪ Transfer Characteristics for various Temperature T_J

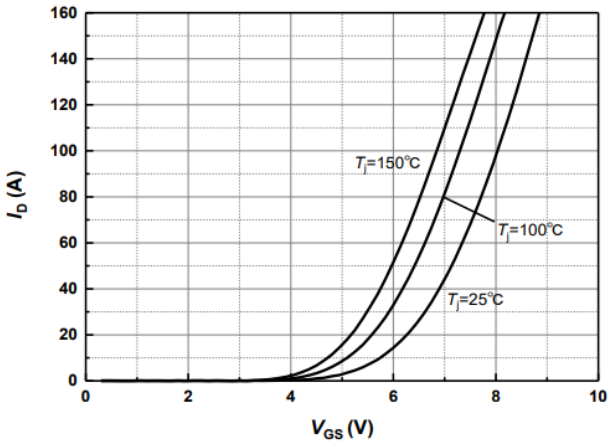


Fig. 4 ▪ Threshold Voltage for various Temperature T_J

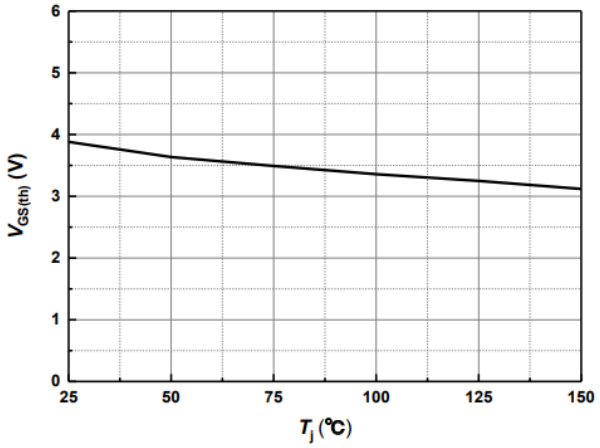


Fig. 5 ▪ Normalized On-Resistance R_{ON} for various Temperature T_J

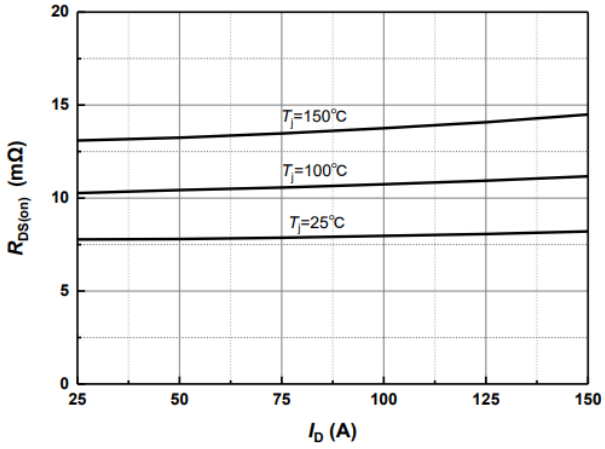
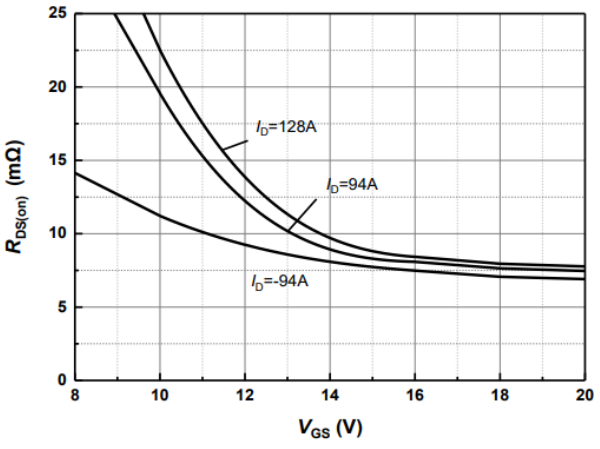


Fig. 6 ▪ On-Resistance R_{ON} vs. Gate-Source Voltage V_{GS} for various Drain Current I_D



REFERENCE DATA ▲ TYPICAL DEVICE PERFORMANCE

Fig. 7 ▪ Capacitances vs. Drain to Source Voltage V_{DS} (0 to 1000V)

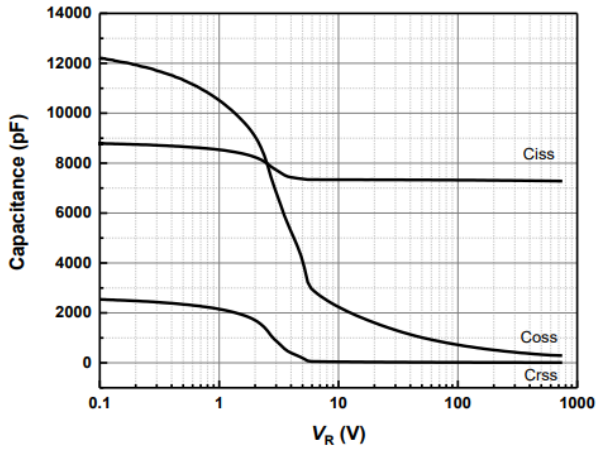


Fig. 8 ▪ 3rd Quadrant Characteristics at T_J = 25°C

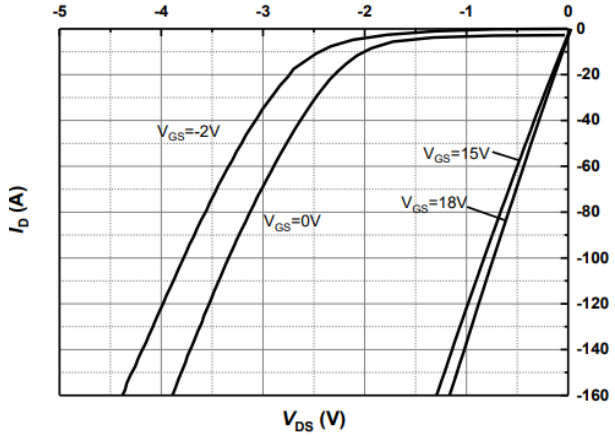


Fig. 9 ▪ 3rd Quadrant Characteristics at T_J = 150°C

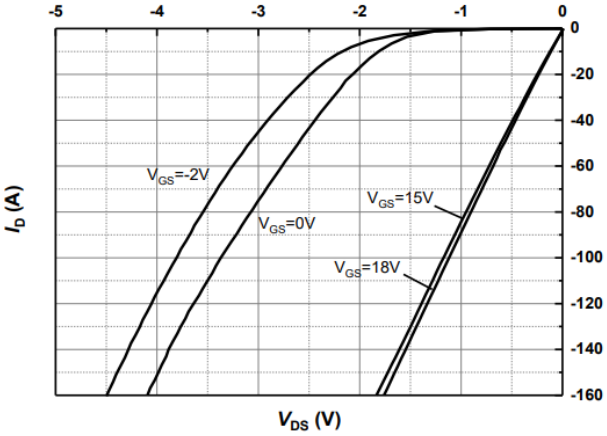


Fig. 10 ▪ Body Diode Forward Voltage V_{SD} vs. Gate-Source Voltage V_{GS} for Various Temperature

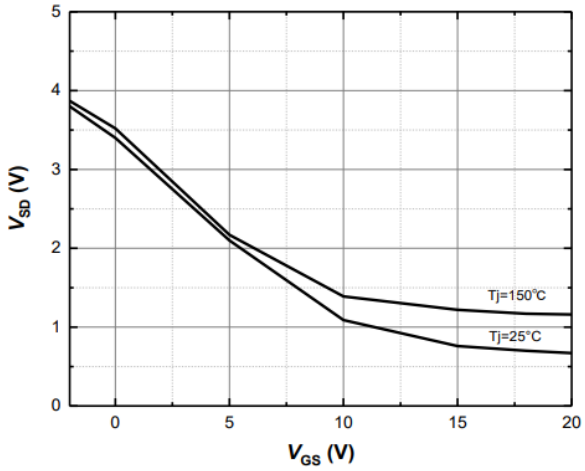


Fig. 11 ▪ C_{OSS} Stored Energy E_{OSS} vs. Drain-Source Voltage V_{DS}

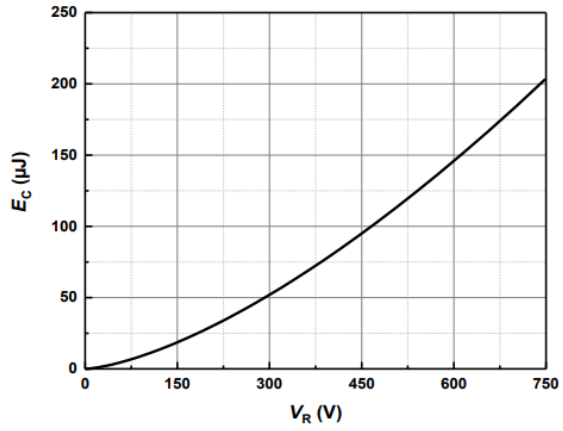
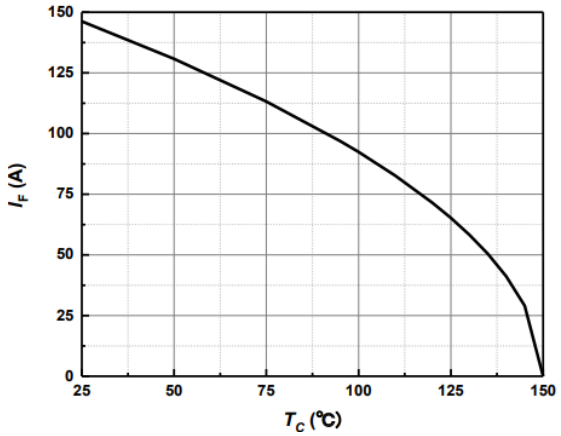


Fig. 12 ▪ Continuous Drain Current Derating I_D vs. Case Temperature T_C



REFERENCE DATA ▲ TYPICAL DEVICE PERFORMANCE

Fig. 13 ▪ Gate Charge Characteristics

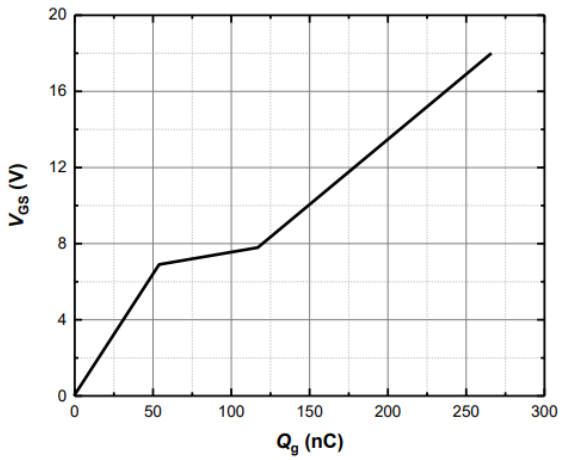


Fig. 14 ▪ Safe Operationg Area

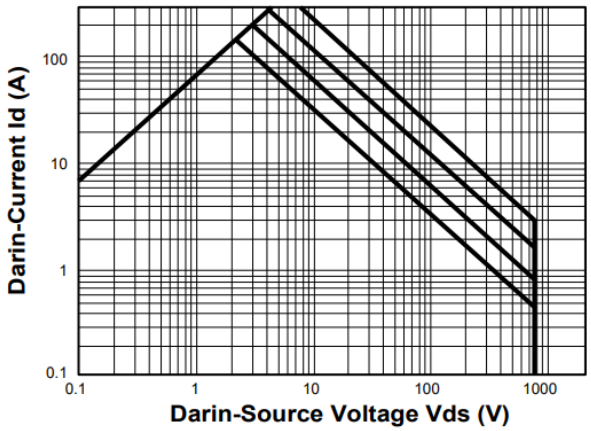


Fig. 15 ▪ Transient Thermal Impedance (Junction – Case)

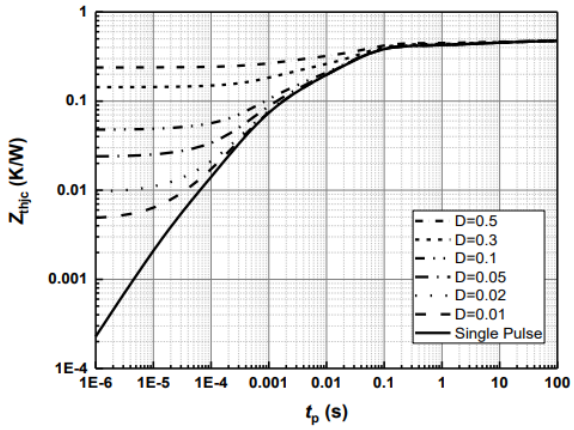


Fig. 16 ▪ Clamped Inductive Switching Energy vs. Drain Current (V_{DS} = 400V)

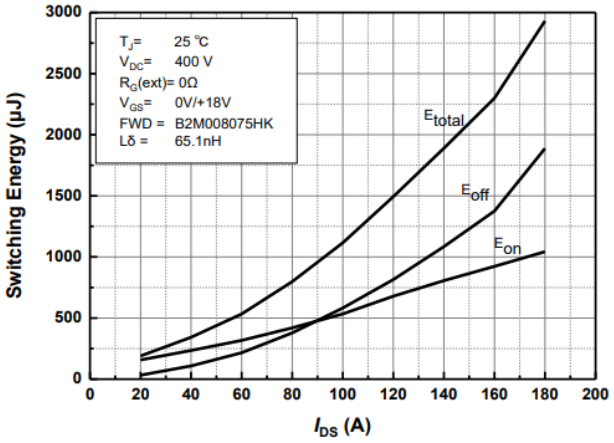


Fig. 17 ▪ Clamped Inductive Switching Energy vs. Drain Current (V_{DS} = 600V)

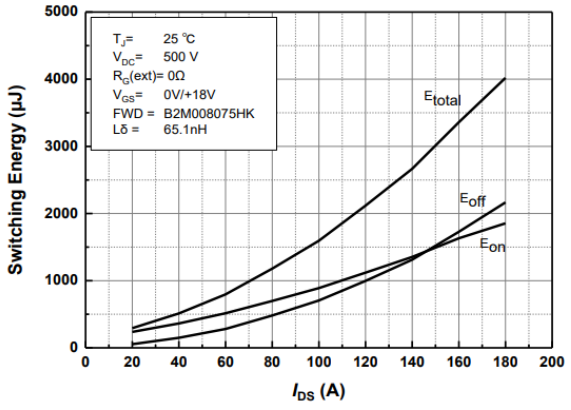
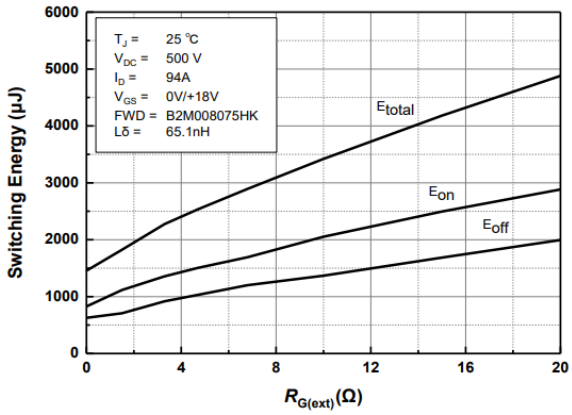
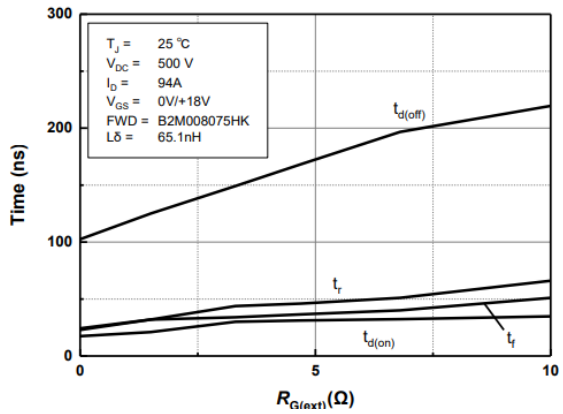


Fig. 18 ▪ Clamped Inductive Switching Energy vs. External Gate Resistance

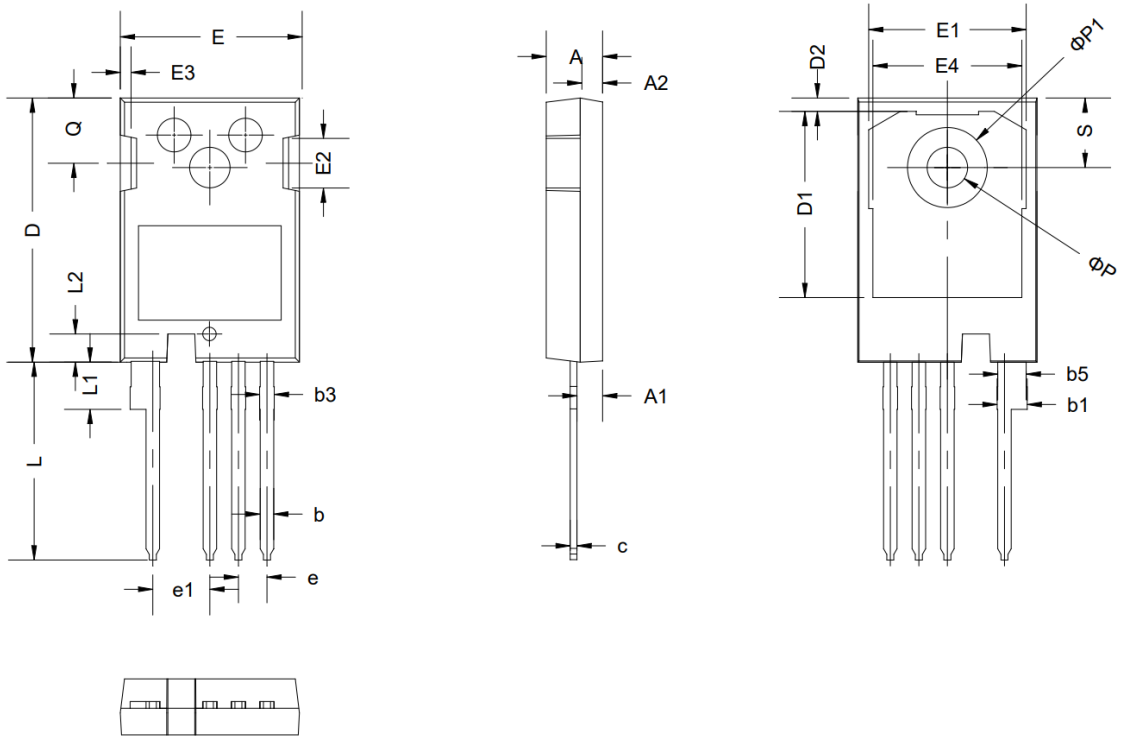


REFERENCE DATA ▲ TYPICAL DEVICE PERFORMANCE

Fig. 19 ▪ Clamped Inductive Switching Energy vs. External Gate Resistor



PACKAGE OUTLINE



Sym	Millimeters (Min.)	Millimeters (Typ.)	Millimeters (Max.)
A	4.83	5.02	5.21
A1	2.29	2.41	2.54
A2	1.91	2.00	2.16
b	1.07	1.20	1.33
b1	2.39	2.67	2.84
b3	1.07	1.30	1.60
B5	2.39	2.53	2.69
c	0.55	0.60	0.68
D	23.30	23.45	23.60
D1	16.25	16.55	17.65
D2	0.95	1.19	1.25
E	15.75	15.94	16.13
E1	13.10	14.02	14.15

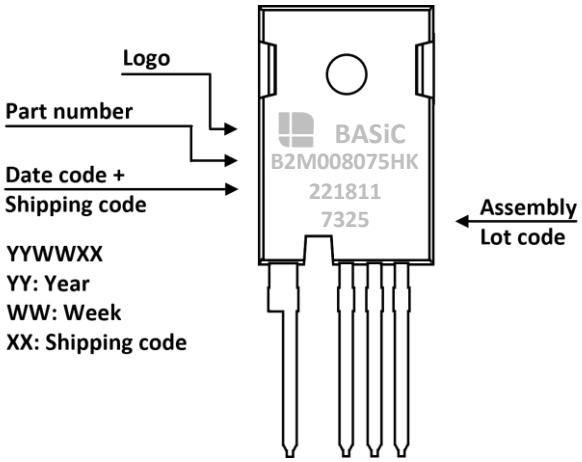
Sym	Millimeters (Min.)	Millimeters (Typ.)	Millimeters (Max.)
E2	3.68	4.40	5.10
E3	1.00	1.45	1.90
E4	12.38	13.26	13.43
e		2.54 BSC	
e1		5.08 BSC	
L	17.31	17.57	17.82
L1	3.97	4.19	4.37
L2	2.35	2.50	2.65
ØP	3.51	3.61	3.65
ØP1		7.19 REF	
Q	5.49	5.79	6.00
S	6.04	6.17	6.30

TO-247-4L package ▲ Epoxy meets UL94-V0

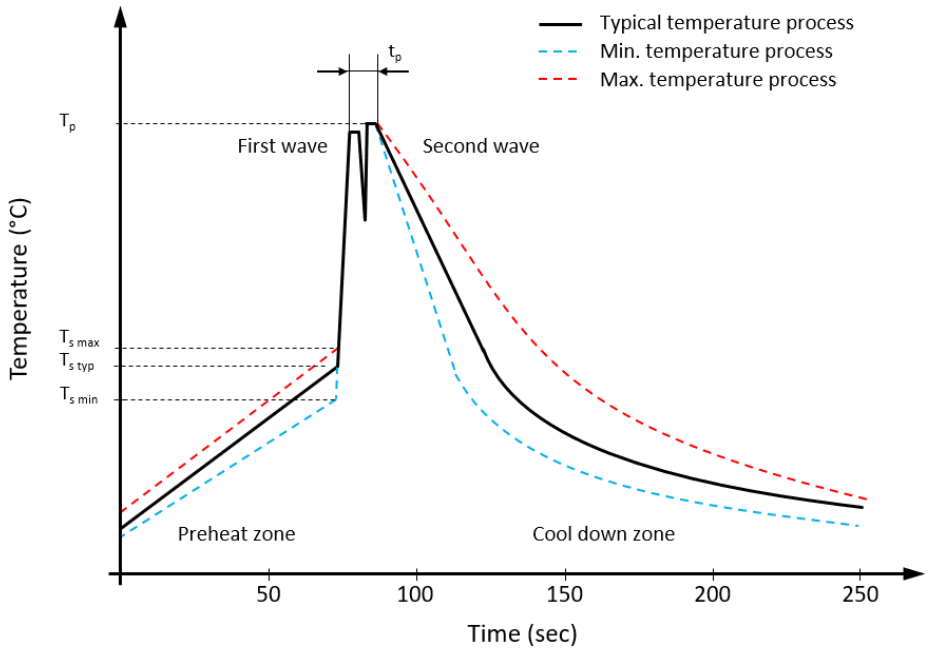
ORDERING INFORMATION

Part Number	Package	Packing	Tube Qty.	Inner Box Qty.	Outer Box Qty.
B2M008075HK	TO-247-4L	Tube	30pcs	300pcs	1,800pcs

PART MARKING



RECOMMENDED WAVE SOLDERING PROFILE ▲ THT PACKAGE



Classification wave soldering profile ▲ Refer to EN 61760-1: 2006

Profile Features		Value ▲ Sn-Pb Assembly	Value ▲ Pb-free Assembly
Preheat temperature min.	$T_{s\,min}$	100 °C	100 °C
Preheat temperature typical	$T_{s\,typ}$	120 °C	120 °C
Preheat temperature max.	$T_{s\,max}$	130 °C	130 °C
Preheat time t_s from $T_{s\,min}$ to $T_{s\,max}$	t_s	70 seconds	70 seconds
Peak temperature	T_p	235 °C to 260 °C	245 °C to 260 °C
Time of actual peak temperature	t_p	Max. 10 seconds Max. 5 second each wave	Max. 10 seconds Max. 5 second each wave
Ramp-down date min.		~ 2 °C/second	~ 2 °C/second
Ramp-down rate typical		~ 3.5 °C/second	~ 3.5 °C/second
Ramp-down rate max.		~ 5 °C/second	~ 5 °C/second
Time 25°C to 25°C		4 minutes	4 minutes

REVISION TABLE

Revision	Date	Status	Notes
001	30/09/2022	Initial release	Initial publication

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