

**Product Summary**

$V_{DS}$	<b>750 V</b>
$I_D (T_c=25^\circ\text{C})$	<b>240 A</b>
$R_{DS(on),typ}$	<b>10 mΩ@<math>V_{GS}=18\text{V}</math></b>

**Features**

- Silver Sintering applied,  $R_{th(j-c)}$  improved
- Low On-Resistance with High Blocking Voltage
- Low Capacitance
- Avalanche Ruggedness
- Halogen Free, Rohs Compliant

**Benefits**

- High Frequency Operation
- Enabling Higher Switching Frequency
- Increased Power Density
- Reduction of Heat Sink Requirements

**Applications**

- Switch Mode Power Supplies (SMPS)
- Power Inverter & Solar Inverter
- Motor Drivers & EV Charging Station
- DC/DC Converter

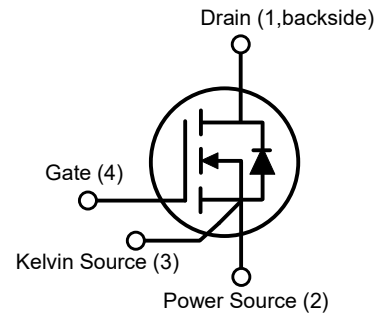
**Package Pin Definitions**

- Pin1 and backside - Drain
- Pin2 - Power Source
- Pin3 - Kelvin Source
- Pin4 - Gate

**Package Parameters**

Part Number	Marking	Package
B3M010C075Z	B3M010C075Z	TO-247-4

**Package: TO-247-4**



**Maximum Ratings**

Symbol	Parameter	Test conditions	Value	Unit
$V_{DSmax}$	Drain-Source Voltage	$V_{GS}=0V, I_D=100\mu A$	750	V
$V_{GSmax}^{1)}$	Gate-Source Voltage		-10/22	V
$V_{GSop}$	Recommend Gate-Source Voltage		-5/18	V
$I_D$	Continuous Drain Current	$V_{GS}=18V, T_C=25^\circ C$	240	A
		$V_{GS}=18V, T_C=100^\circ C$	169	A
$I_{D,pulse}$	Pulsed Drain Current	Pulse with $t_p$ limited by $T_{jmax}$	480	A
$P_{tot}$	Power Dissipation	$T_C=25^\circ C, T_j=175^\circ C$	750	W
$T_j$	Operating Junction Temperature		-55~175	$^\circ C$
$T_{stg}$	Storage Temperature		-55~175	$^\circ C$
$M_d$	TO-247 mounting torque	M3 Screw	0.7	N·m

1) Note: When using MOSFET Body Diode  $V_{GSmax} = -5/22V$

**Electrical Characteristics (Defined at  $T_j=25^\circ C$  unless otherwise specified)**
**Static Characteristics**

Symbol	Parameter	Test conditions	Value			Unit
			Min.	Typ.	Max.	
$V_{(BR)DSS}$	Drain-Source Breakdown Voltage	$V_{GS}=0V, I_D=100\mu A$	750			V
$V_{GS(th)}$	Gate Threshold Voltage	$V_{GS}=V_{DS}, I_D=26mA$ (tested after 1ms pulse at $V_{GS}=20V$ )		2.7		V
		$V_{GS}=V_{DS}, I_D=26mA, T_j=175^\circ C$ (tested after 1ms pulse at $V_{GS}=20V$ )		1.9		
$I_{GSS}$	Gate-Source Leakage Current	$V_{GS}=18V, V_{DS}=0V$			100	nA
$I_{DSS}$	Zero Gate Voltage Drain Current	$V_{DS}=750V, V_{GS}=0V$		1		$\mu A$
		$V_{DS}=750V, V_{GS}=0V, T_j=175^\circ C$		12		
$R_{DS(on)}$	Drain-Source On-State Resistance	$V_{GS}=18V, I_D=80A$		10		m $\Omega$
		$V_{GS}=18V, I_D=80A, T_j=175^\circ C$		12.5		
		$V_{GS}=15V, I_D=80A$		13.5		
$g_{fs}$	Transconductance	$V_{DS}=10V, I_D=80A$		46		S

**Thermal Characteristics**

Symbol	Parameter	Value			Unit
		Min.	Typ.	Max.	
$R_{th(jc)}$	Thermal Resistance from Junction to Case		0.20		K/W

**AC Characteristics**

Symbol	Parameter	Test conditions	Value			Unit
			Min.	Typ.	Max.	
$C_{iss}$	Input Capacitance	$V_{GS}=0V, V_{DS}=500V$ $f=100kHz, V_{AC}=25mV$		5500		pF
$C_{oss}$	Output Capacitance			370		pF
$C_{rss}$	Reverse Transfer Capacitance			19		pF
$E_{oss}$	$C_{oss}$ Stored Energy			59		μJ
$C_{O(ER)}$	Effective Output Capacitance, Energy Related	$V_{GS}=0V, 0V < V_{DS} < 500V$		470		pF
$C_{O(TR)}$	Effective Output Capacitance, Time Related	$V_{GS}=0V, 0V < V_{DS} < 500V$		685		pF
$R_{G(int)}$	Internal Gate Resistance	$f=1MHz, V_{AC}=25mV$		1.7		Ω

**Gate Charge Characteristics**

Symbol	Parameter	Test conditions	Value			Unit
			Min.	Typ.	Max.	
$Q_{GS}$	Gate to Source Charge	$V_{DS}=500V$ $I_D=80A$ $V_{GS}=-5/+18V$		64		nC
$Q_{GD}$	Gate to Drain Charge			78		nC
$Q_G$	Total Gate Charge			220		nC

**Switching Characteristics**

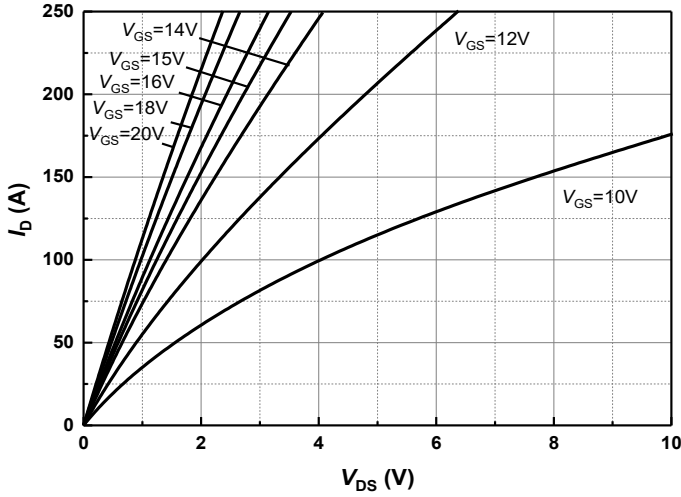
Symbol	Parameter	Test conditions	Value			Unit	
			Min.	Typ.	Max.		
$t_{d(on)}$	Turn-On Delay Time	$V_{DC}=500V, V_{GS}=-5/18V$ $I_D=80A, R_{G(ext)}=10\Omega$ $L_\sigma=50nH, T_j=25^\circ C$ diode: body diode at $V_{GS}=-5V$ Inductive Load Eon includes diode reverse recovery		21		ns	
$t_r$	Rise Time			45		ns	
$t_{d(off)}$	Turn-Off Delay Time				81		ns
$t_f$	Fall Time				16		ns
$E_{on}$	Turn-On Energy				910		uJ
$E_{off}$	Turn-Off Energy				625		uJ
$E_{on}$	Turn-On Energy		$V_{DC}=500V, V_{GS}=-5/18V$ $I_D=80A, R_{G(ext)}=10\Omega$ $L_\sigma=50nH, T_j=25^\circ C$ FWD <sup>2)</sup> : B4D40120H		770		uJ
$E_{off}$	Turn-Off Energy				720		uJ
$t_{d(on)}$	Turn-On Delay Time	$V_{DC}=500V, V_{GS}=-5/18V$ $I_D=80A, R_{G(ext)}=10\Omega$ $L_\sigma=50nH, T_j=175^\circ C$ diode: body diode at $V_{GS}=-5V$ Inductive Load Eon includes diode reverse recovery		15		ns	
$t_r$	Rise Time				44		ns
$t_{d(off)}$	Turn-Off Delay Time				103		ns
$t_f$	Fall Time				18		ns
$E_{on}$	Turn-On Energy				950		uJ
$E_{off}$	Turn-Off Energy				700		uJ
$E_{on}$	Turn-On Energy		$V_{DC}=500V, V_{GS}=-5/18V$ $I_D=80A, R_{G(ext)}=10\Omega$ $L_\sigma=50nH, T_j=175^\circ C$ FWD <sup>2)</sup> : B4D40120H		650		uJ
$E_{off}$	Turn-Off Energy				780		uJ

2) Note: FWD: Freewheeling diode

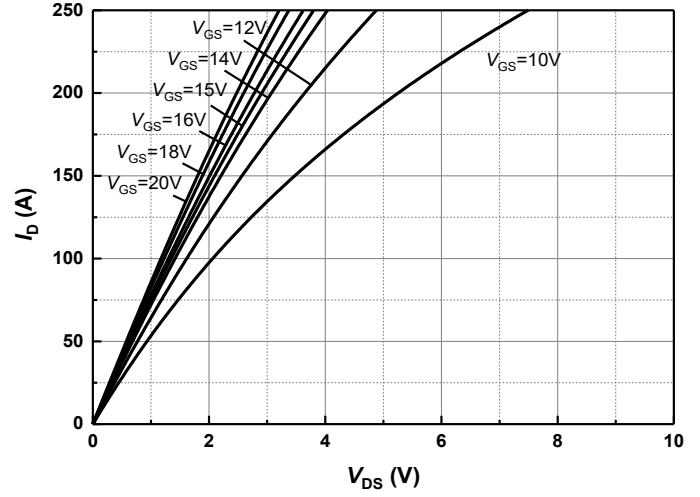
**Reverse Diode Characteristics**

Symbol	Parameter	Test conditions	Value			Unit
			Min.	Typ.	Max.	
$V_{SD}$	Diode Forward Voltage	$V_{GS}=-5V, I_{SD}=40A, T_j=25^{\circ}C$		4.0		V
	Diode Forward Voltage	$V_{GS}=-5V, I_{SD}=40A, T_j=175^{\circ}C$		3.6		V
$I_S$	Continuous Diode Forward Current	$V_{GS}=-5V, T_j=25^{\circ}C$		135		A
$I_{S,pulse}$	Pulse Diode Current	$V_{GS}=-5V$ , pulse width $t_p$ limited by $T_{jmax}$		345		A
$t_{rr}$	Reverse Recovery Time	$V_{GS}=-5V, V_{DC}=500V, I_{SD}=80A$ $-di_F/dt=3400A/\mu s$ $T_j=25^{\circ}C$		20		ns
$Q_{rr}$	Reverse Recovery Charge			460		nC
$I_{rrm}$	Peak Reverse Recovery Current			37		A
$t_{rr}$	Reverse Recovery Time	$V_{GS}=-5V, V_{DC}=500V, I_{SD}=80A$ $-di_F/dt=3800A/\mu s$ $T_j=175^{\circ}C$		25		ns
$Q_{rr}$	Reverse Recovery Charge			840		nC
$I_{rrm}$	Peak Reverse Recovery Current			55		A

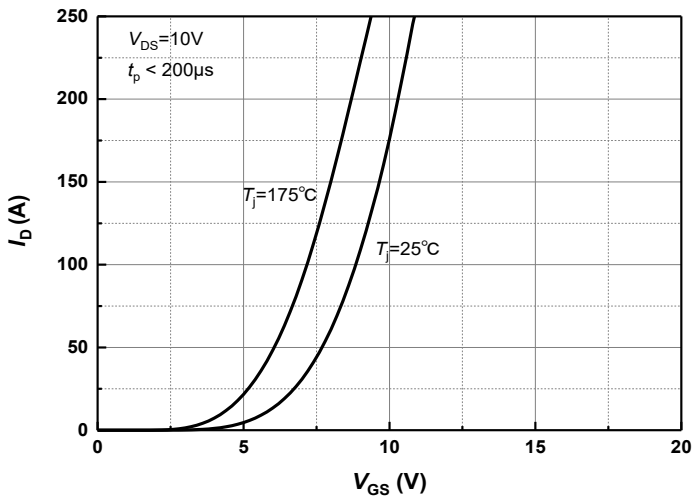
**Typical Performance**



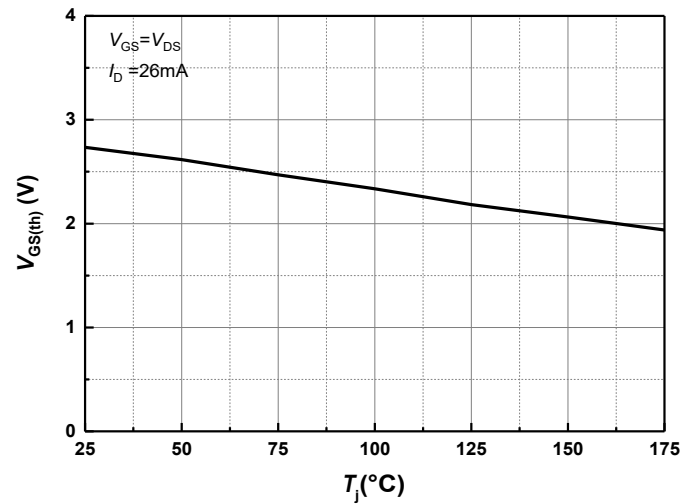
**Figure 1** Typical Forward Output Characteristics at  $T_j = 25^\circ\text{C}$



**Figure 2** Typical Forward Output Characteristics at  $T_j = 175^\circ\text{C}$



**Figure 3** Transfer Characteristics for Various Temperatures



**Figure 4** Threshold Voltage for Various Temperature

Typical Performance

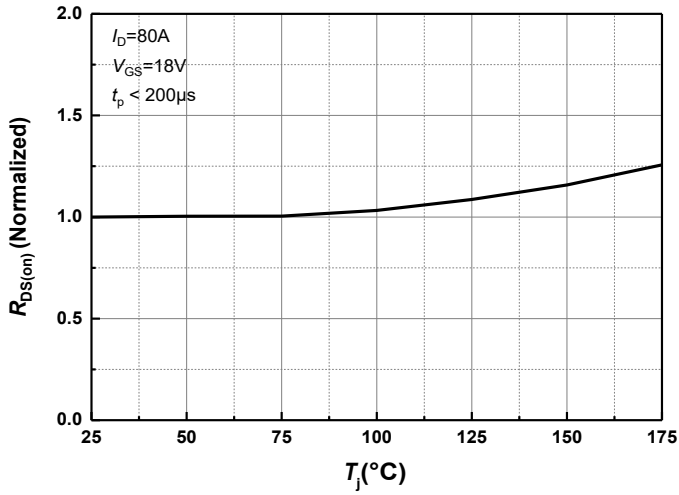


Figure 5 Normalized On-Resistance vs. Temperature

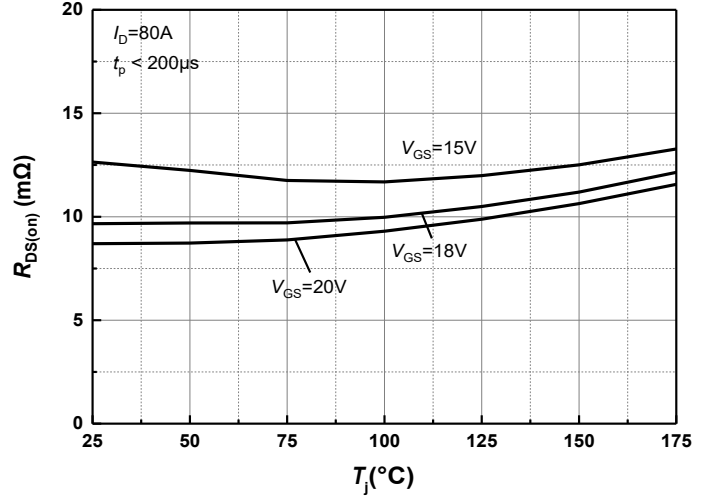


Figure 6 On-Resistance vs. Temperature for Various Gate-Source Voltages

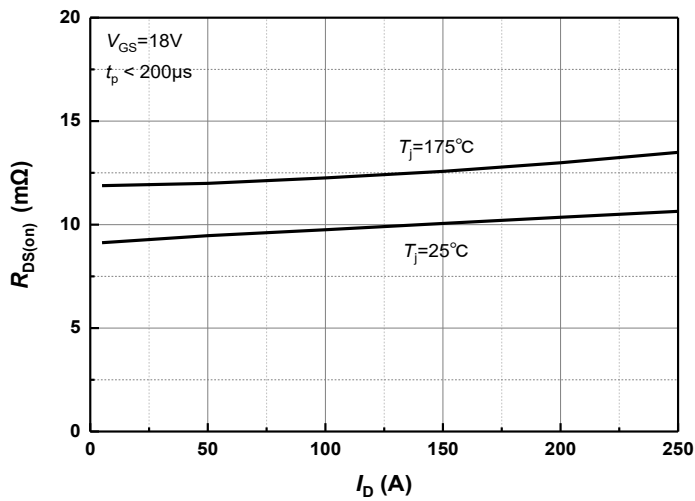


Figure 7 On-Resistance vs. Drain Current for Various Temperature

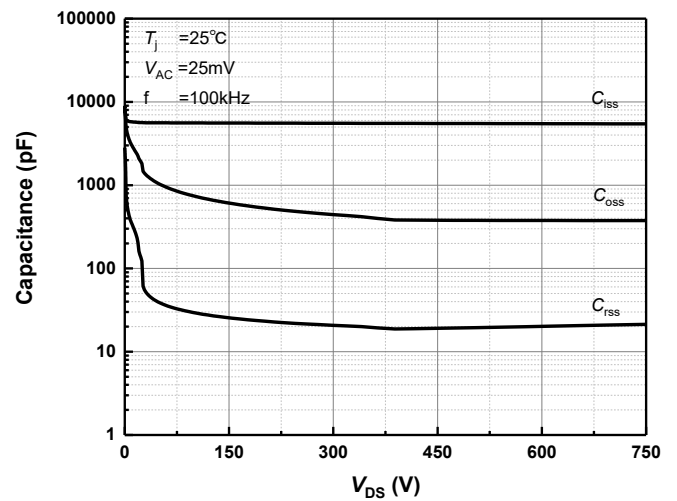
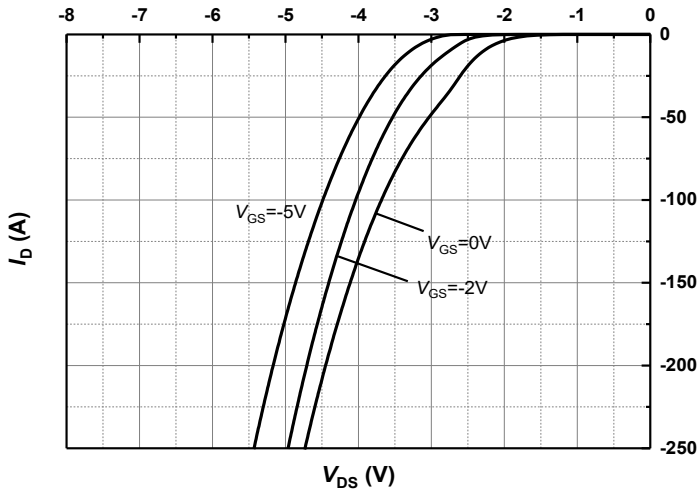
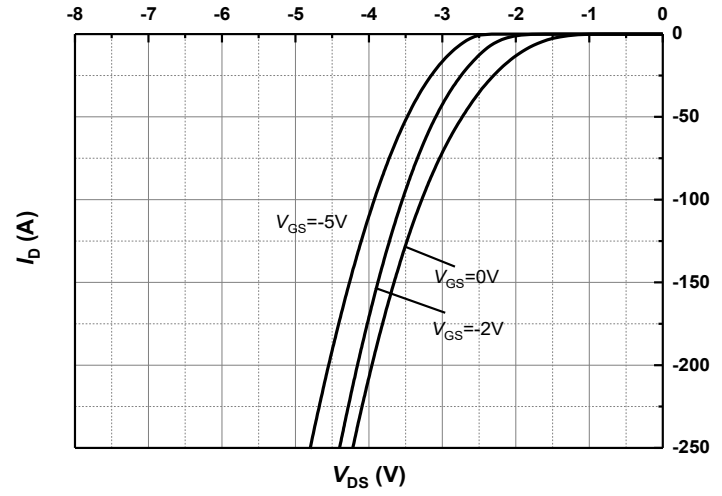


Figure 8 Capacitance vs. Drain-Source Voltage (0 - 750V)

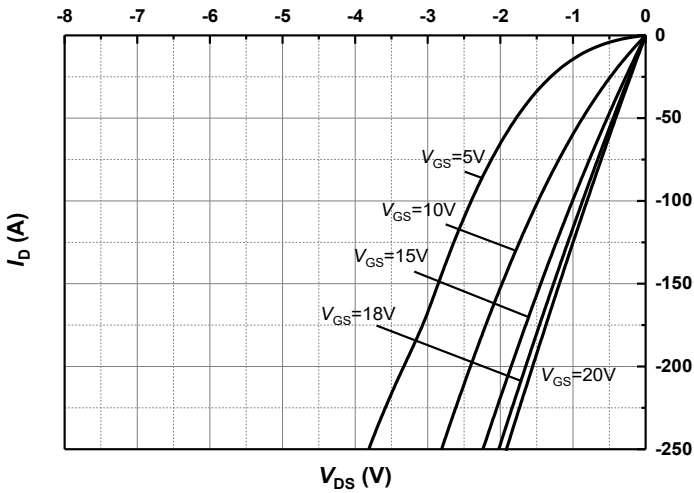
**Typical Performance**



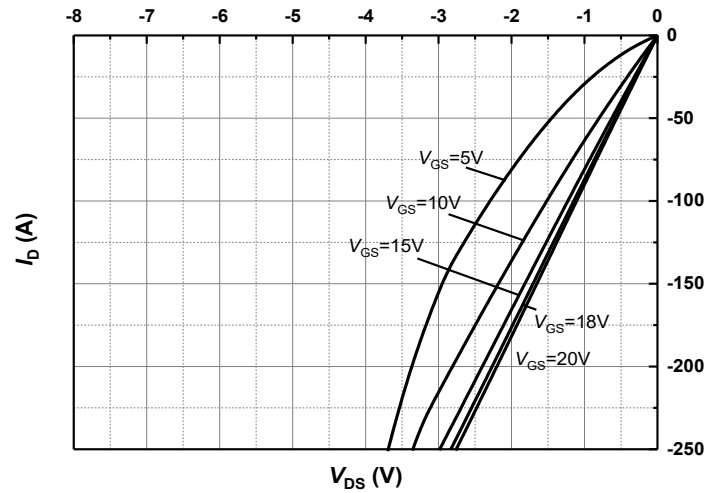
**Figure 9** Body Diode Characteristics at  $T_j=25^{\circ}\text{C}$



**Figure 10** Body Diode Characteristics at  $T_j=175^{\circ}\text{C}$

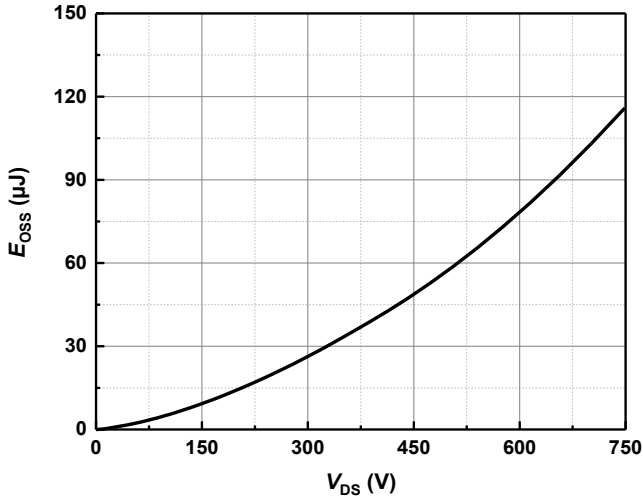


**Figure 11** 3rd Quadrant Characteristics at  $T_j=25^{\circ}\text{C}$

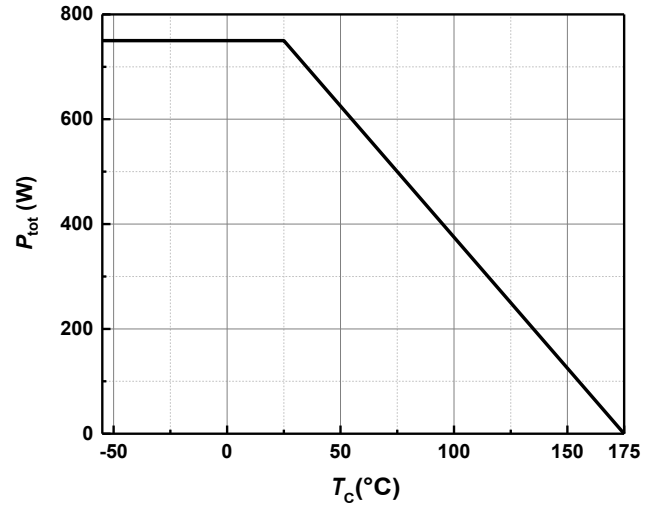


**Figure 12** 3rd Quadrant Characteristics at  $T_j=175^{\circ}\text{C}$

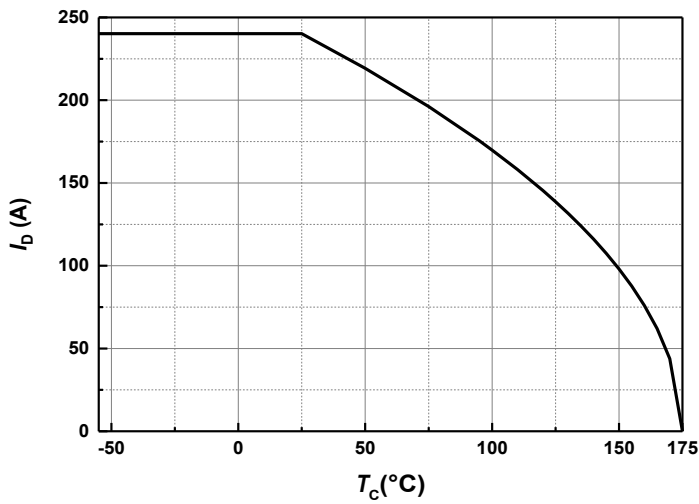
**Typical Performance**



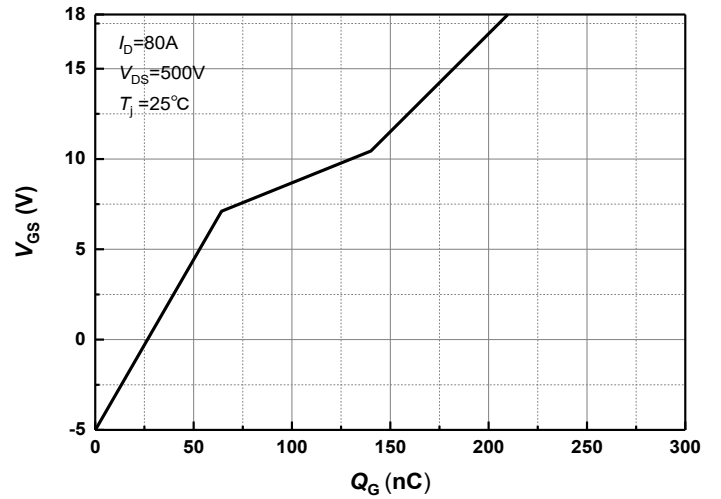
**Figure 13 Output Capacitor stored Energy**



**Figure 14 Maximum Power Dissipation Derating vs. Case Temperature**

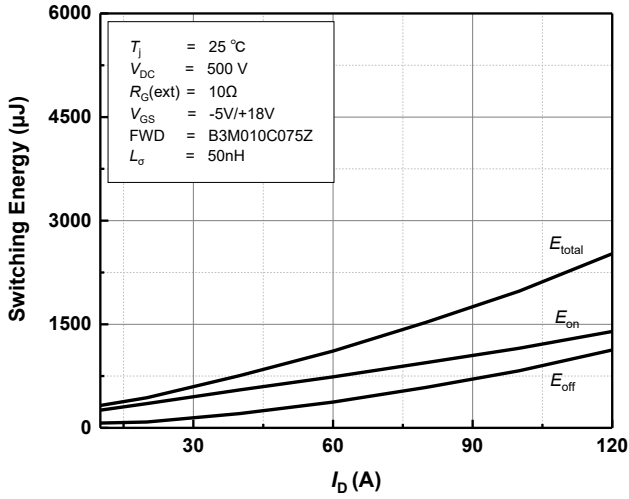


**Figure 15 Continuous Drain Current Derating vs. Case Temperature**

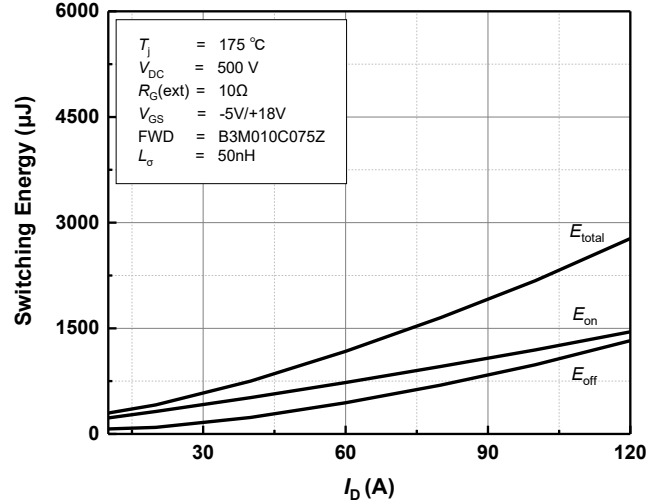


**Figure 16 Gate Charge Characteristics**

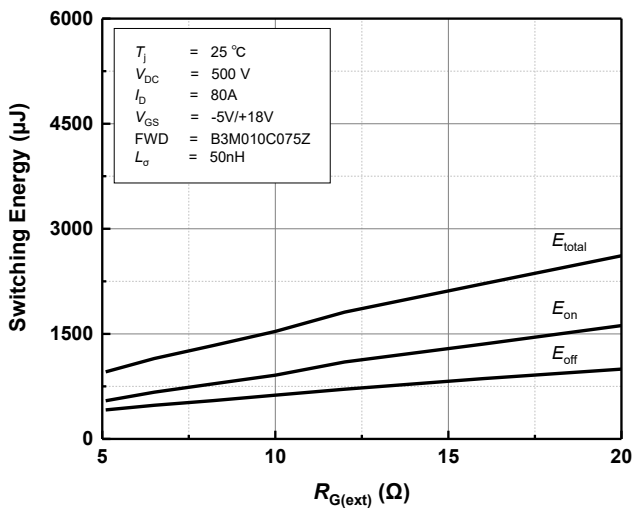
**Typical Performance**



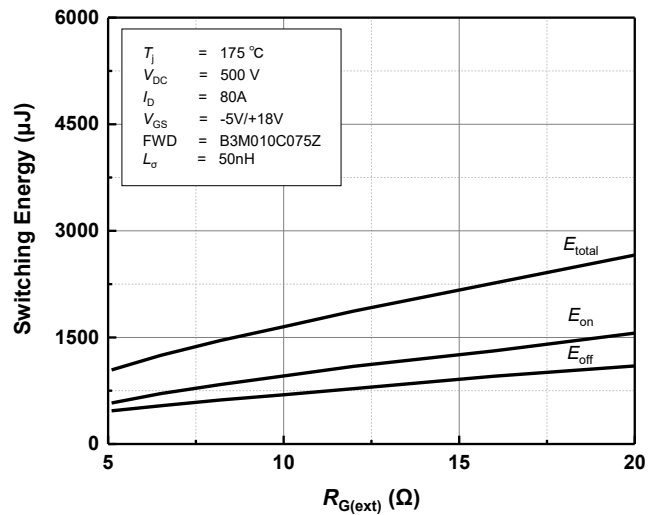
**Figure 17 Clamped Inductive Switching Energy vs. Drain Current ( $V_{DC} = 500V$ ) at  $T_j = 25^\circ C$**



**Figure 18 Clamped Inductive Switching Energy vs. Drain Current ( $V_{DC} = 500V$ ) at  $T_j = 175^\circ C$**

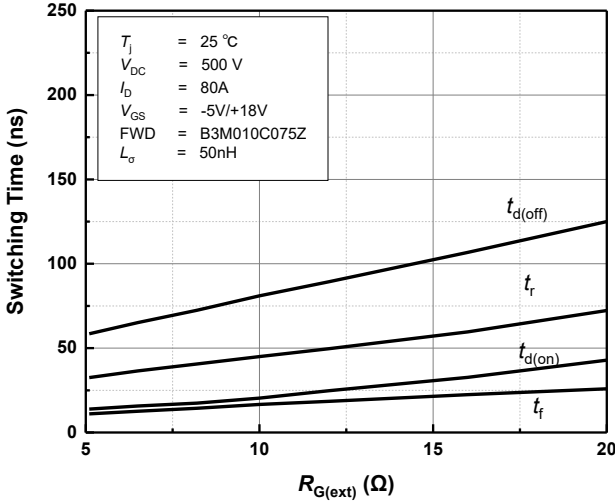


**Figure 19 Clamped Inductive Switching Energy vs. External Gate Resistance at  $T_j = 25^\circ C$**

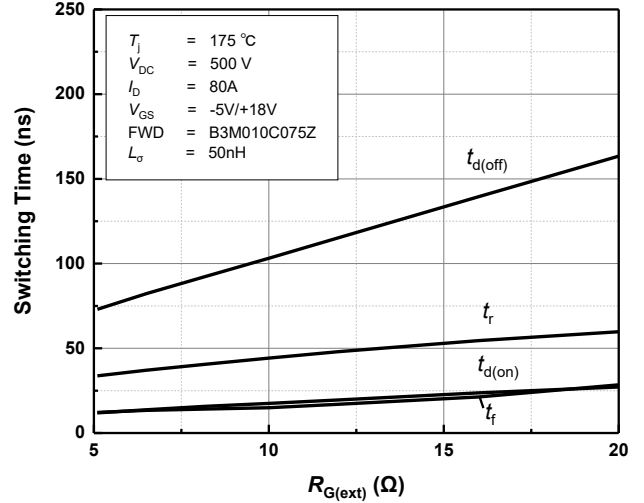


**Figure 20 Clamped Inductive Switching Energy vs. External Gate Resistance at  $T_j = 25^\circ C$**

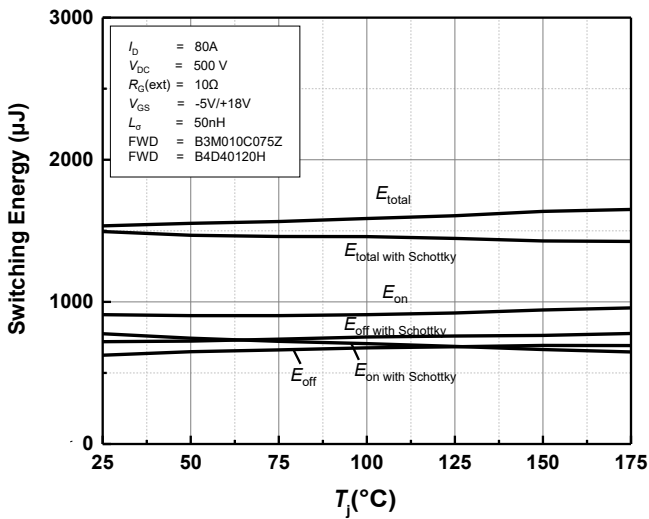
**Typical Performance**



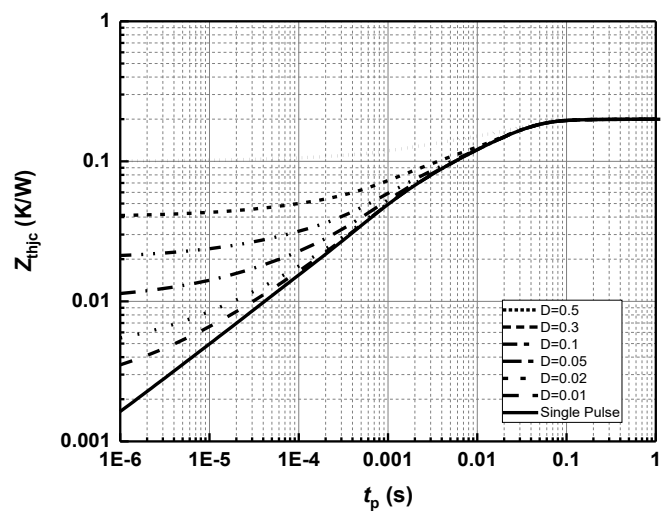
**Figure 21 Clamped Inductive Switching Time vs. External Gate Resistance at  $T_j=25^\circ\text{C}$**



**Figure 22 Clamped Inductive Switching Time vs. External Gate Resistance at  $T_j=175^\circ\text{C}$**



**Figure 23 Clamped Inductive Switching Energy vs. Temperature**



**Figure 24 Transient Thermal Impedance (Junction - Case)**

Typical Performance

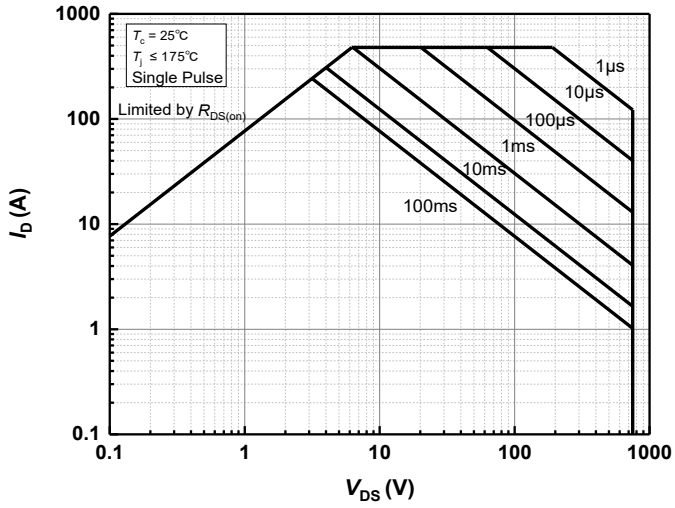
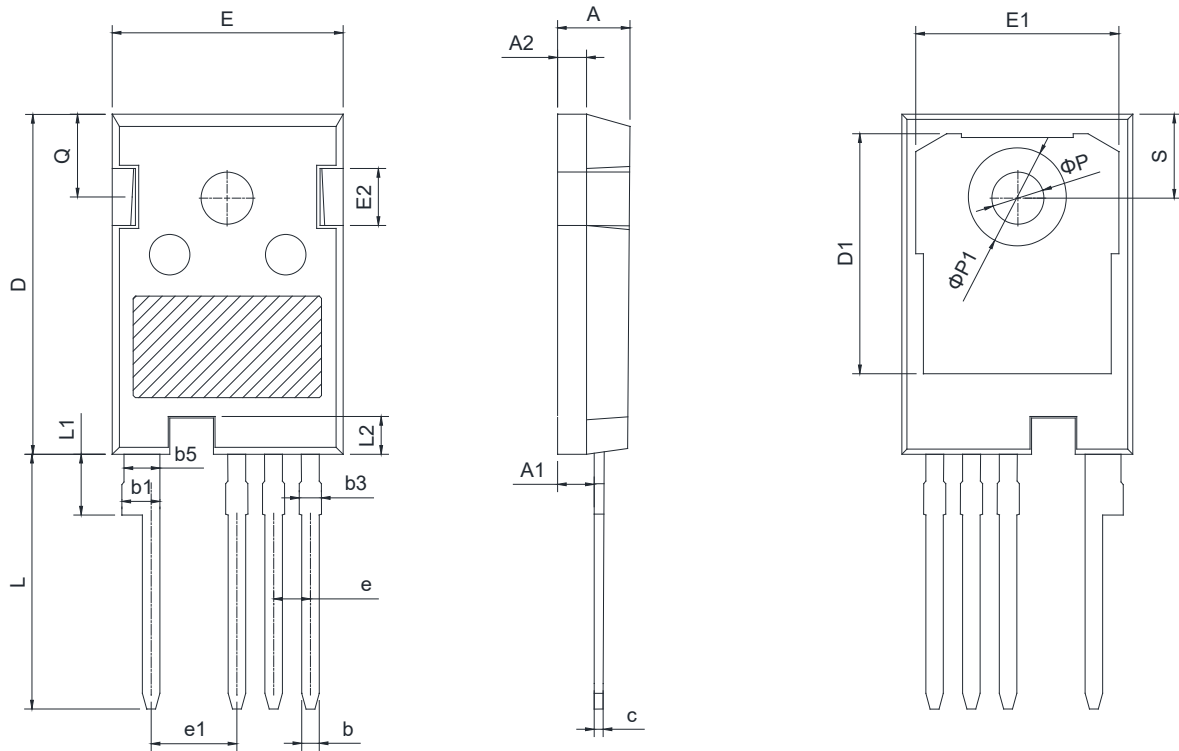


Figure 25 Forward Biased Safe Operating Area

**Package Dimensions**


SYMBOL	mm		
	MIN	NOM	MAX
A	4.80	5.00	5.21
A1	2.21	2.41	2.61
A2	1.80	2.00	2.20
b	1.06	1.21	1.36
b1	2.33	2.63	2.93
b3	1.07	1.30	1.60
b5	2.30	2.53	2.72
c	0.51	0.61	0.75
D	23.30	23.45	23.60
D1	16.25	16.55	17.65
E	15.74	15.94	16.14
E1	13.72	14.02	14.32
E2	3.68	4.40	5.10
e	2.54 BSC		
e1	5.08 BSC		
L	17.27	17.57	17.87
L1	3.97	4.19	4.39
L2	2.35	2.50	2.65
φ p	3.40	3.60	3.80
φ p1	7.19REF		
Q	5.49	5.79	6.09
S	6.00	6.17	6.40

**Revision History**

<b>Document Version</b>	<b>Date of Release</b>	<b>Description of Changes</b>
Rev. 0.0	2025-04-29	Release of the target datasheet.
Rev. 0.1	2025-07-25	Update the relevant data and curves.

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