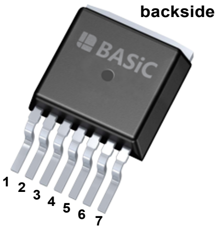
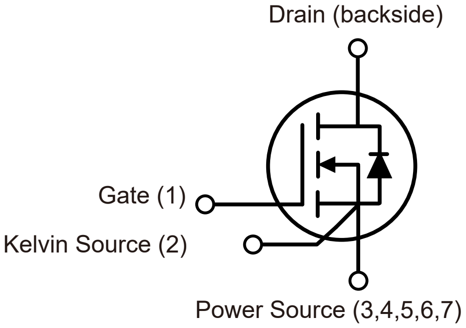
Product Summary

V_{DS}	650 V
I_D (T_C=25°C)	108 A
$R_{DS(on).typ}$	25 mΩ@V_{GS}=18V

Package: TO-263-7





Features

- 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

Halogen

RoHS

Package Pin Definitions

- backside - Drain
- Pin1 - Gate
- Pin2 - Kelvin Source
- Pin3,4,5,6,7 - Power Source

Package Parameters

Part Number	Marking	Package
B3M025065R	B3M025065R	TO-263-7

Maximum Ratings

Symbol	Parameter	Test conditions	Value	Unit
V_{DSmax}	Drain-Source Voltage	V_{GS}=0V, I_D=100μA	650	V
V_{GSmax}	Gate-Source Voltage		-10/22	V
V_{GSop}	Recommended Gate-Source Voltage		-5/18	V
I_D	Continuous Drain Current	V_{GS}=18V, T_C=25°C	108	A
		V_{GS}=18V, T_C=100°C	76	A
$I_{D,pulse}$	Pulsed Drain Current	Pulse width t_p limited by T_{jmax}	161	A
P_{tot}	Power Dissipation	T_C=25°C, T_j=175°C	375	W
T_j	Operating Junction Temperature		-55~175	°C
T_{stg}	Storage Temperature		-55~175	°C

Electrical Characteristics (Defined at T_j=25°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=100μA	650			V
$V_{GS(th)}$	Gate Threshold Voltage	V_{GS}=V_{DS}, I_D=17mA (tested after 1ms pulse at V_{GS}=20V)	2.3	2.7	3.5	V
		V_{GS}=V_{DS}, I_D=17mA,T_j=175°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}=650V, V_{GS}=0V		1	50	μA
		V_{DS}=650V, V_{GS}=0V,T_j=175°C		10	200	
$R_{DS(on)}$	Drain-Source On-State Resistance	V_{GS}=18V, I_D=50A		25	40	mΩ
		V_{GS}=18V, I_D=50A,T_j=175°C		32		
		V_{GS}=15V, I_D=50A		33		
g_{fs}	Transconductance	V_{DS}=10V, I_D=50A		22		S

Thermal Characteristics

Symbol	Parameter	Value			Unit
		Min.	Typ.	Max.	
$R_{th(jc)}$	Thermal Resistance from Junction to Case		0.40		K/W

AC Characteristics

Symbol	Parameter	Test conditions	Value			Unit
			Min.	Typ.	Max.	
C_{iss}	Input Capacitance	V_{GS}=0V, V_{DS}=400V f=100kHz, V_{AC}=25mV		2450		pF
C_{oss}	Output Capacitance			180		pF
C_{rss}	Reverse Transfer Capacitance			9		pF
E_{oss}	C_{oss} Stored Energy			20		μJ
$C_{O(ER)}$	Effective Output Capacitance, Energy Related	V_{GS}=0V, 0V < V_{DS} < 400V		250		pF
$C_{O(TR)}$	Effective Output Capacitance, Time Related	V_{GS}=0V, 0V < V_{DS} < 400V		365		pF
$R_{G(int)}$	Internal Gate Resistance	f=1MHz, V_{AC}=25mV		1.4		Ω

Gate Charge Characteristics

Symbol	Parameter	Test conditions	Value			Unit
			Min.	Typ.	Max.	
Q_{GS}	Gate to Source Charge	V_{DS}=400V I_D =50A V_{GS}=-5/+18V		33		nC
Q_{GD}	Gate to Drain Charge			40		nC
Q_G	Total Gate Charge			98		nC

Switching Characteristics

Symbol	Parameter	Test conditions	Value			Unit
			Min.	Typ.	Max.	
$t_{d(on)}$	Turn-On Delay Time	V_{DC}=400V, V_{GS}=-5/18V I_D=50A, $R_{G(ext)}$=15Ω $L_σ$=50nH, T_j=25°C FWD 1): 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			54		ns
t_f	Fall Time			12		ns
E_{on}	Turn-On Energy (FWD=Body Diode)			420		μJ
E_{off}	Turn-Off Energy (FWD=Body Diode)			225		μJ
E_{on}	Turn-On Energy (FWD=SiC SBD)	V_{DC}=400V, V_{GS}=-5/18V I_D=50A, $R_{G(ext)}$=15Ω $L_σ$=50nH, T_j=25°C FWD 1): B3D40065H		375		μJ
E_{off}	Turn-Off Energy (FWD=SiC SBD)			230		μJ
$t_{d(on)}$	Turn-On Delay Time	V_{DC}=400V, V_{GS}=-5/18V I_D=50A, $R_{G(ext)}$=15Ω $L_σ$=50nH, T_j=175°C FWD 1): body diode at V_{GS}=-5V Inductive Load Eon includes diode reverse recovery		9		ns
t_r	Rise Time			39		ns
$t_{d(off)}$	Turn-Off Delay Time			68		ns
t_f	Fall Time			12		ns
E_{on}	Turn-On Energy (FWD=Body Diode)			430		μJ
E_{off}	Turn-Off Energy (FWD=Body Diode)			225		μJ
E_{on}	Turn-On Energy (FWD=SiC SBD)	V_{DC}=400V, V_{GS}=-5/18V I_D=50A, $R_{G(ext)}$=15Ω $L_σ$=50nH, T_j=175°C FWD 1): B3D40065H		270		μJ
E_{off}	Turn-Off Energy (FWD=SiC SBD)			230		μJ

1) 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}=25A, T_j=25°C		4.4		V
		V_{GS}=-5V, I_{SD}=25A, T_j=175°C		3.7		
I_{SD}	Continuous Diode Forward Current	V_{GS}=-5V, T_C=25°C		60		A
$I_{SD,pulse}$	Pulsed Diode Current	V_{GS}=-5V, pulse width t_p limited by T_{jmax}		120		A
t_{rr}	Reverse Recovery Time	V_{GS}=-5V, V_{DC}=400V, I_{SD}=50A -di_F/dt=2300A/μs T_j=25°C		15		ns
Q_{rr}	Reverse Recovery Charge			180		nC
I_{rrm}	Peak Reverse Recovery Current			20		A
t_{rr}	Reverse Recovery Time	V_{GS}=-5V, V_{DC}=400V, I_{SD}=50A -di_F/dt=3300A/μs T_j=175°C		20		ns
Q_{rr}	Reverse Recovery Charge			450		nC
I_{rrm}	Peak Reverse Recovery Current			35		A

Typical Performance

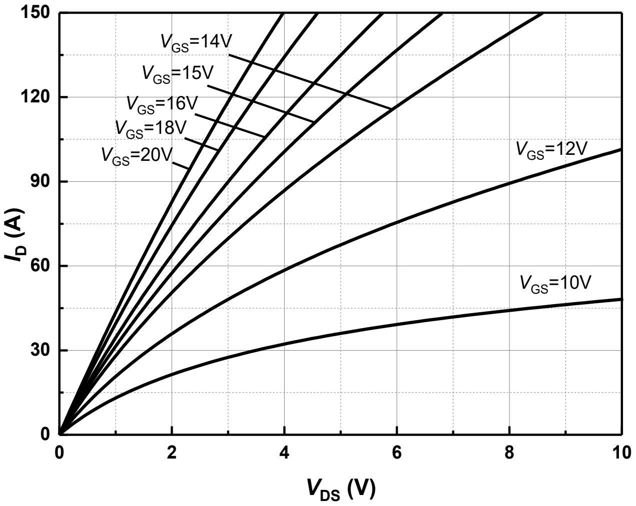


Figure 1 **Typical Forward Output Characteristics at T_j=25°C**

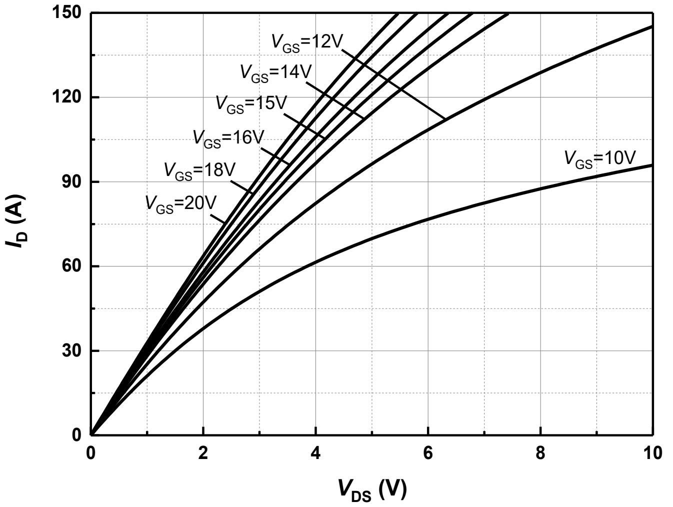


Figure 2 **Typical Forward Output Characteristicsat T_j=175°C**

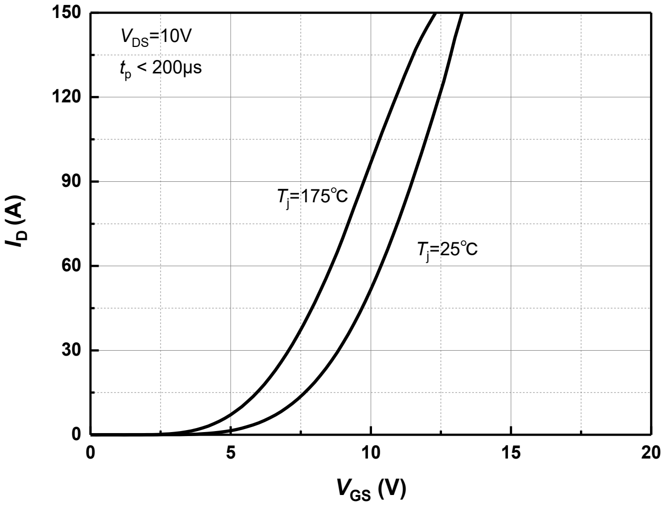


Figure 3 **Transfer Characteristics for Various Temperature**

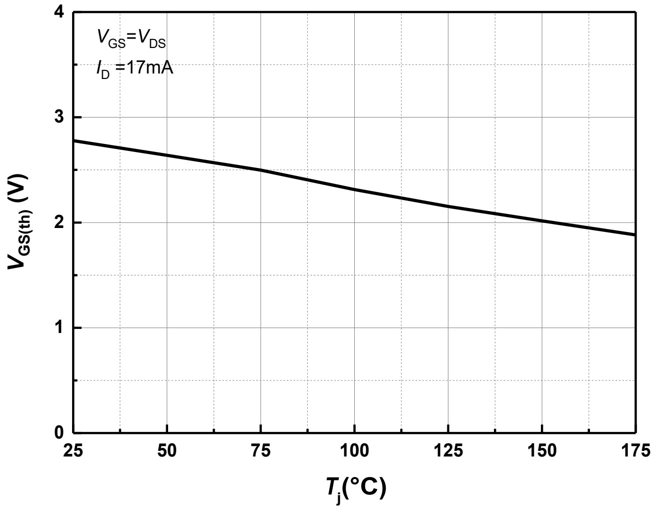


Figure 4 **Threshold Voltage for Various Temperature**

Typical Performance

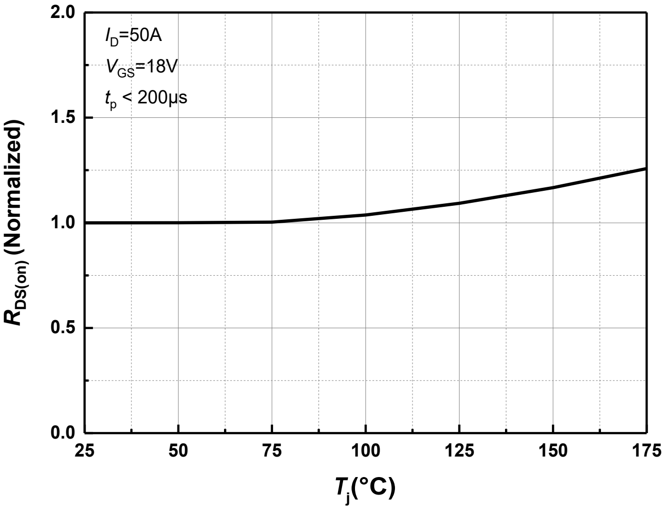


Figure 5 **Normalized On-Resistance vs. Temperature**

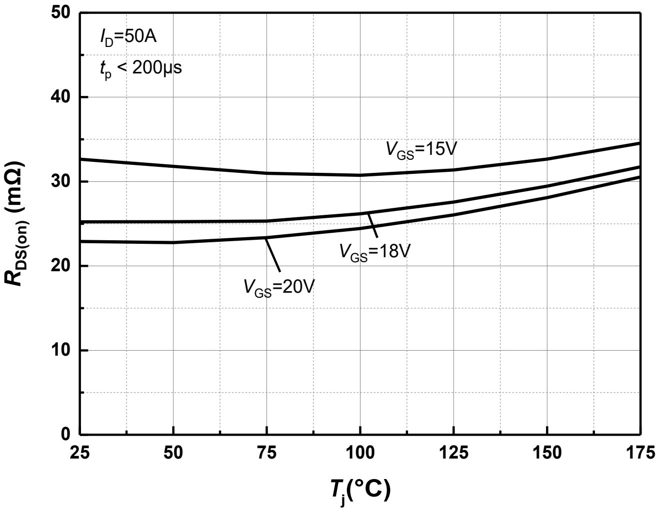


Figure 6 **On-Resistance vs. Temperature for Various Gate-Source Voltage**

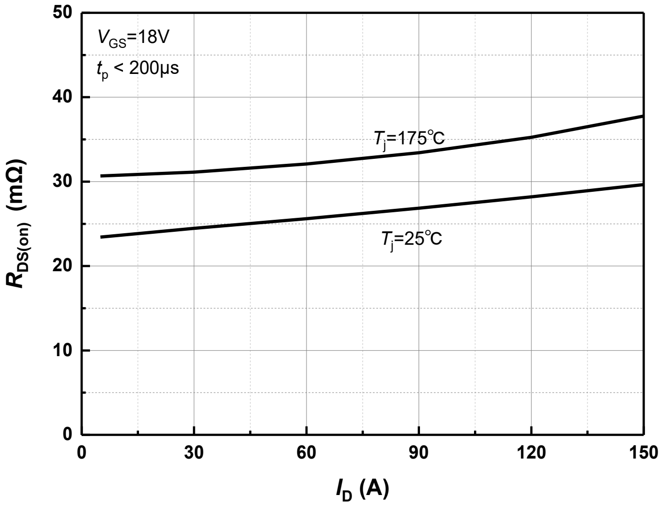


Figure 7 **On-Resistance vs. Drain Current for Various Temperature**

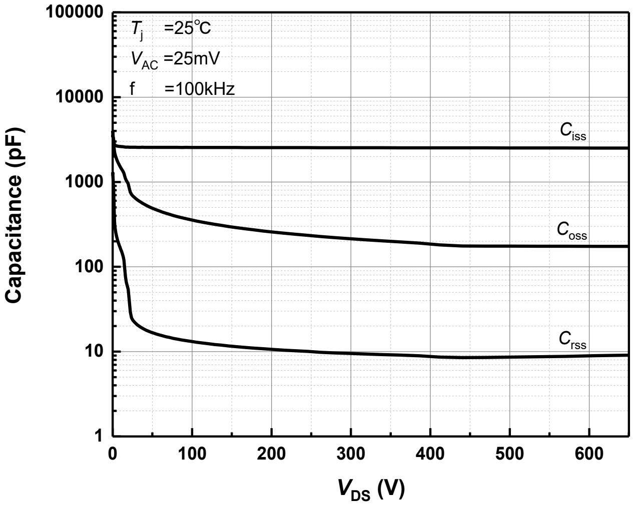


Figure 8 **Capacitance vs. Drain-Source Voltage (0 - 650V)**

Typical Performance

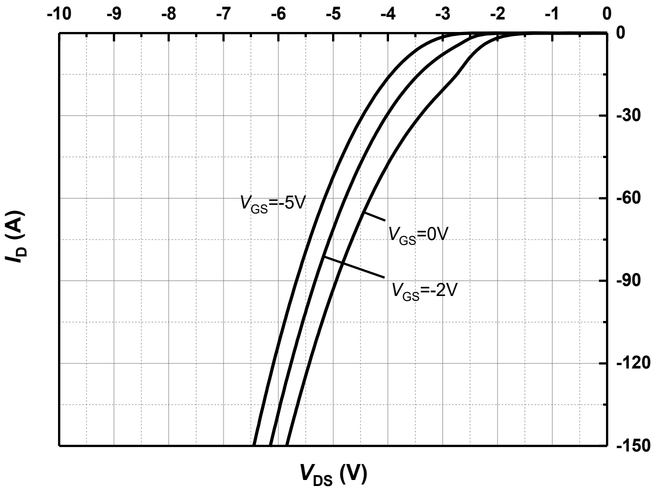


Figure 9 **Body Diode Characteristics at T_j=25°C**

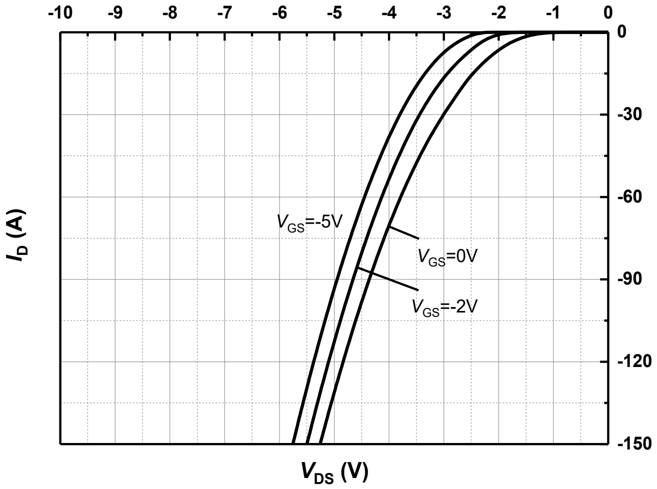


Figure 10 **Body Diode Characteristics at T_j=175°C**

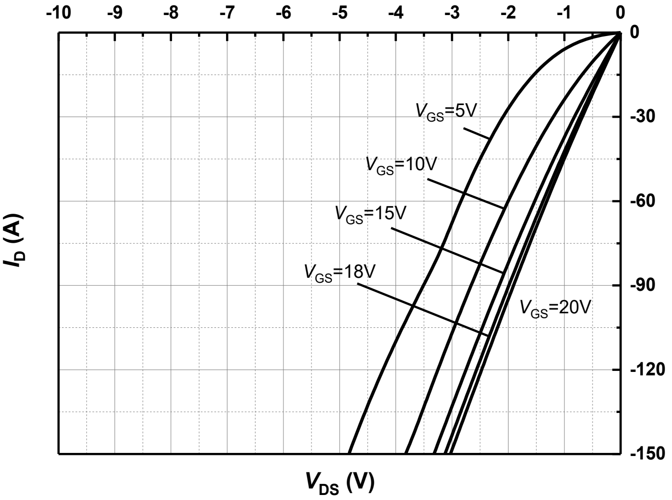


Figure 11 **3rd Quadrant Characteristics at T_j=25°C**

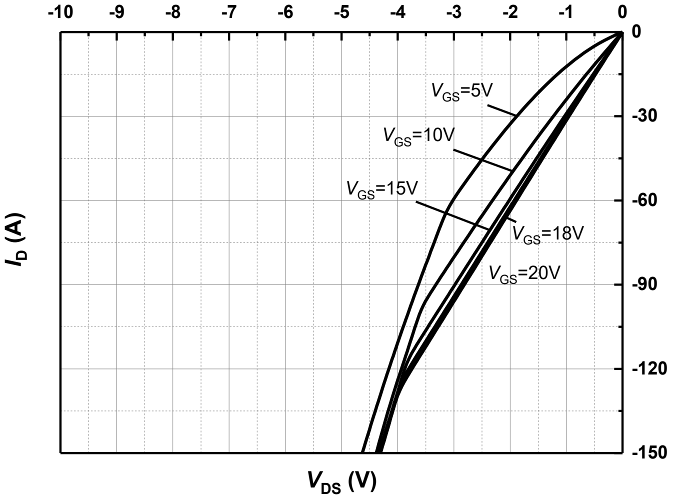


Figure 12 **3rd Quadrant Characteristics at T_j=175°C**

Typical Performance

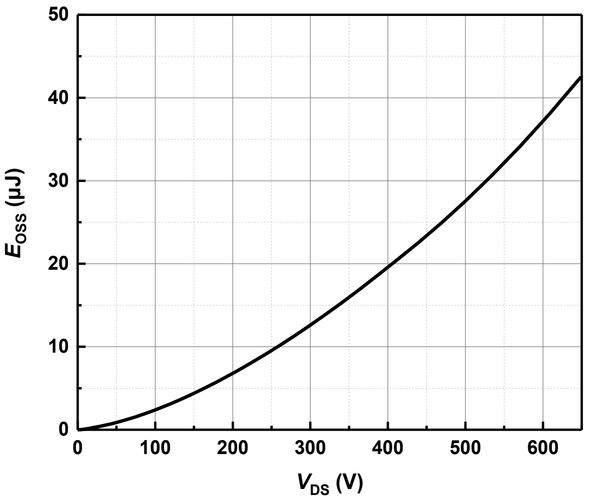


Figure 13 Output Capacitor stored Energy

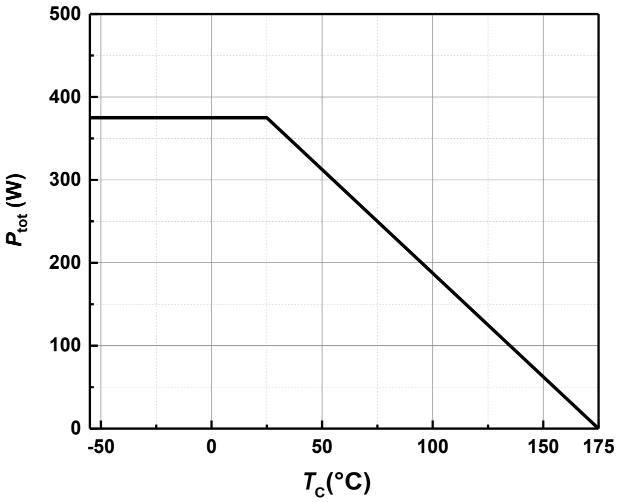


Figure 14 Maximum Power Dissipation Derating vs. Case Temperature

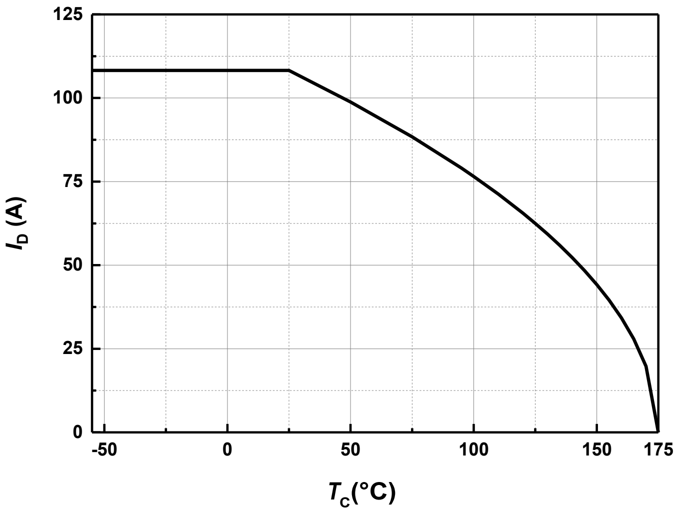


Figure 15 Continuous Drain Current Derating vs. Case Temperature

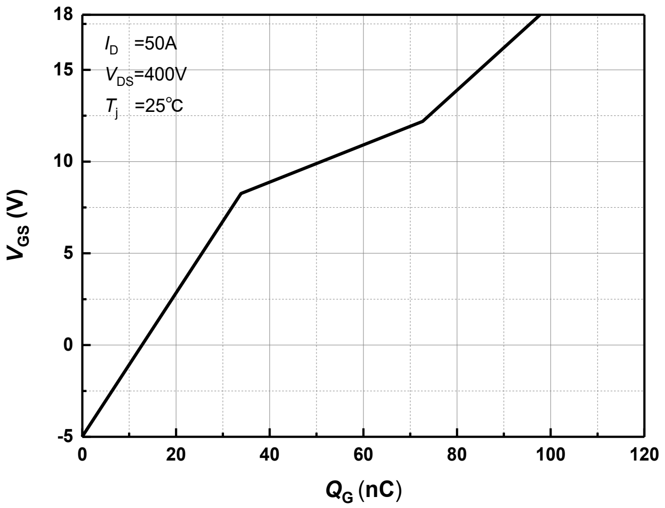


Figure 16 Gate Charge Characteristics

Typical Performance

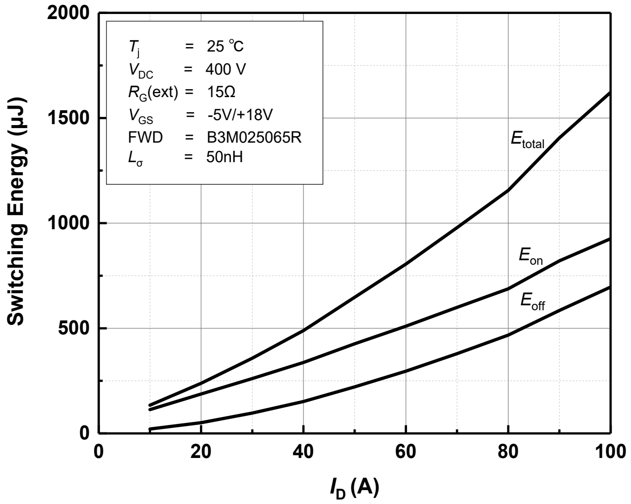


Figure 17 Clamped Inductive Switching Energy vs. Drain Current (V_{DC} = 400V) at T_j=25°C

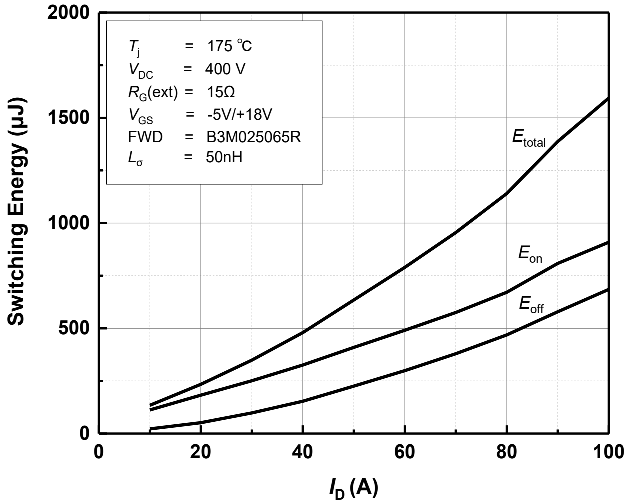


Figure 18 Clamped Inductive Switching Energy vs. Drain Current (V_{DC} = 400V) at T_j=175°C

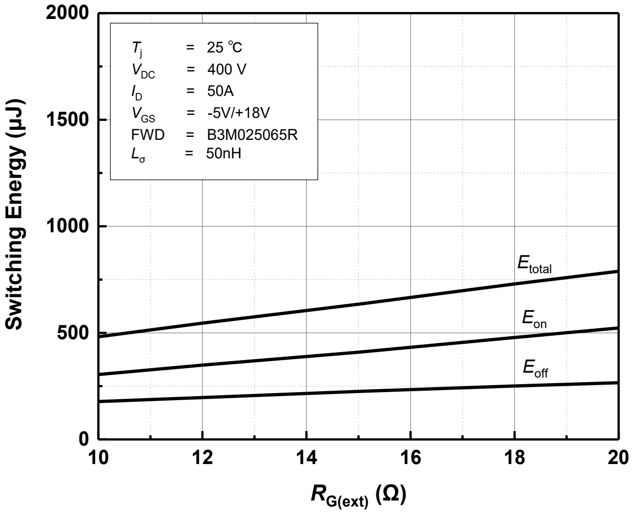


Figure 19 Clamped Inductive Switching Energy vs. External Gate Resistance at T_j=25°C

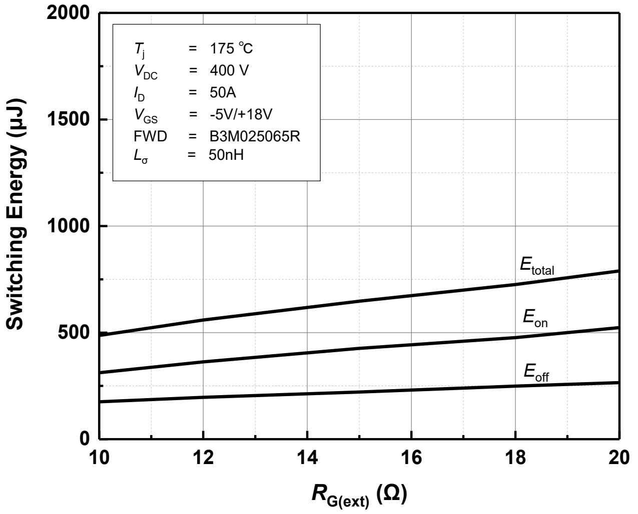


Figure 20 Clamped Inductive Switching Energy vs. External Gate Resistance at T_j=175°C

Typical Performance

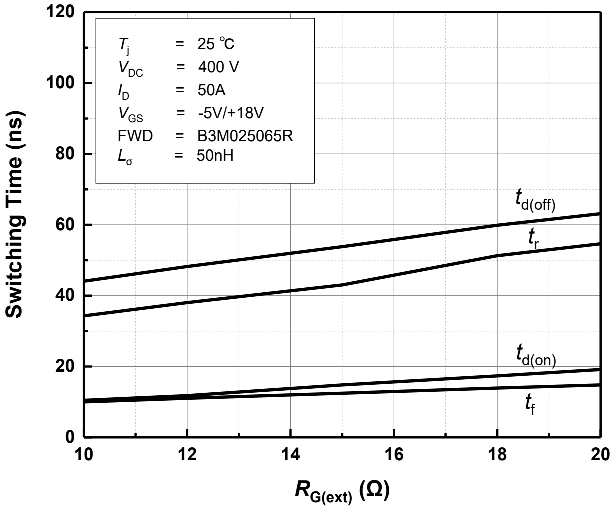


Figure 21 Clamped Inductive Switching Time vs. External Gate Resistance at T_j=25°C

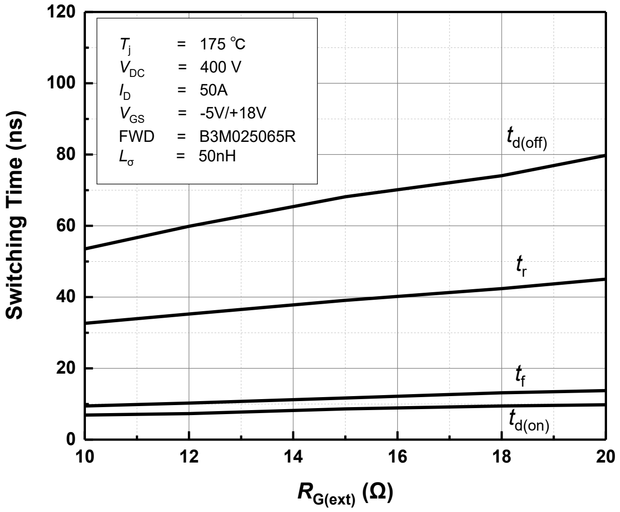


Figure 22 Clamped Inductive Switching Time vs. External Gate Resistance at T_j=175°C

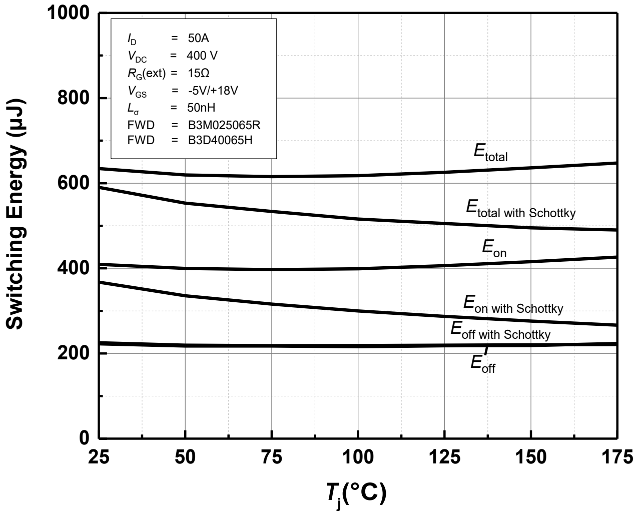


Figure 23 Clamped Inductive Switching Energy vs. Temperature

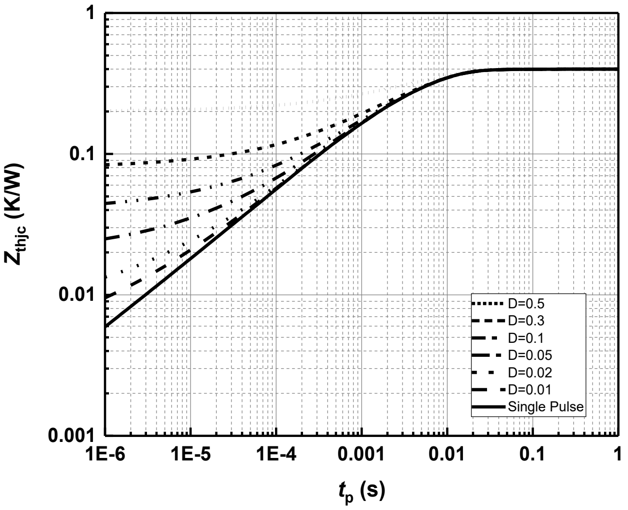


Figure 24 Transient Thermal Impedance (Junction - Case)

Typical Performance

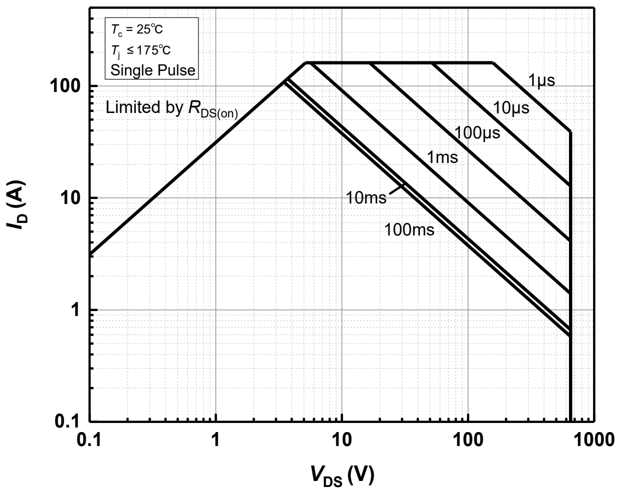
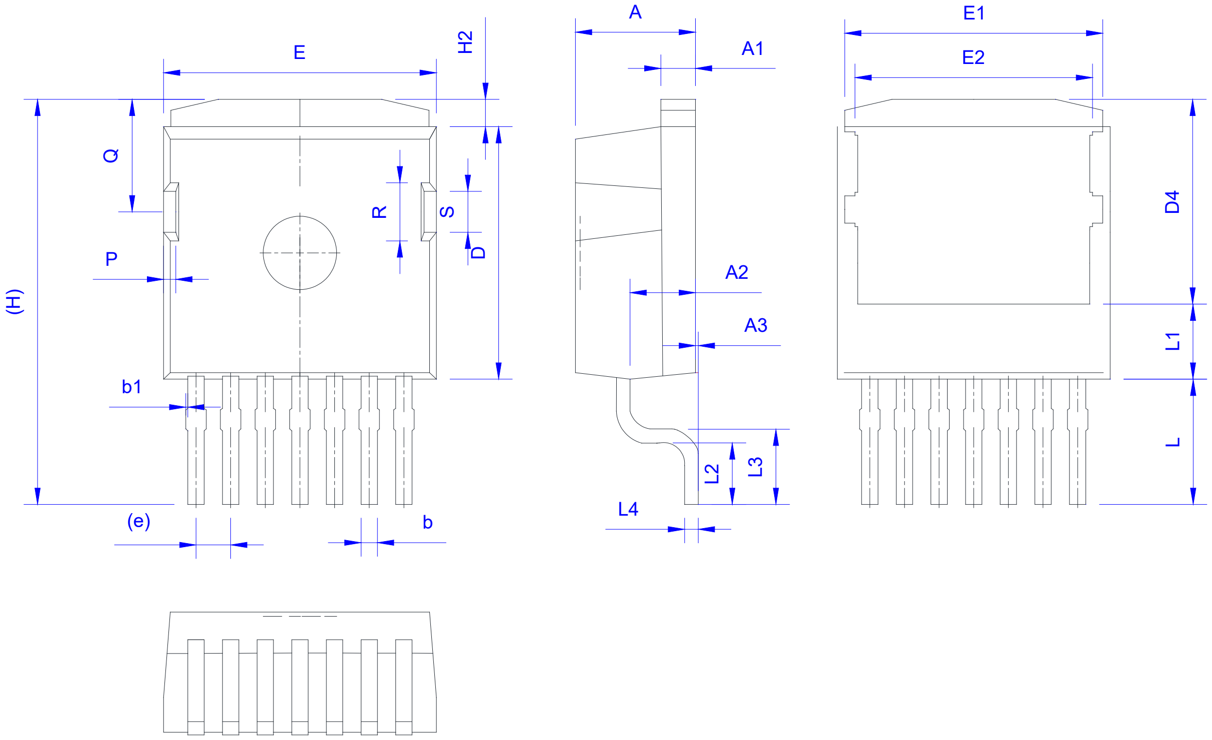


Figure 25 **Forward Biased Safe Operating Area**

Package Dimensions



SYMBOL	mm		
	MIN	NOM	MAX
A	4.30	4.43	4.56
A1	1.17	1.27	1.40
A2	2.30	2.40	2.50
A3	0.00	0.13	0.25
b	0.50	0.60	0.70
b1	0.00	0.80	0.15
D	9.05	9.25	9.45
D4	7.30	7.40	7.50
E	9.80	10.00	10.20
E1	9.36	9.46	9.56
E2	8.40	8.50	8.60
e	1.170	1.270	1.370
H	14.00	15.00	16.00
H2	0.70	1.00	1.30
L	4.20	4.70	5.20
L1	2.85REF		
L2	1.70	2.00	2.30
L3	2.700REF		
L4	0.40	0.50	0.60
P	0.35	0.45	0.55
Q	4.02	4.12	4.22
R	2.03	2.13	2.23
S	1.40	1.50	1.60

REF： For reference only, no measurement is required.

Revision History

Document Version	Date of Release	Description of Changes
Rev. 0.0	2025-12-29	Draft datasheet created.

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Information

For further information on technology, delivery terms and conditions and prices, please contact the nearest BASiC Semiconductor Office.

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