GCMX034B120B2H2P

V_{DS}	1200 V
$R_{DS,on}$	34.0 mΩ
$I_{D\ (TC=25C)}$	49 A
T_J,max	175°C

QSiC™ 1200V SiC Full-Bridge Module

Features

- High speed switching SiC MOSFETs
- Reliable body diode
- All parts tested to greater than 1,350V
- Kelvin reference for stable operation
- Press fit terminal connections
- Split DC negative terminals

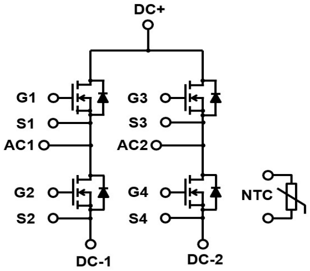
Benefits

- Low switching losses
- Low junction to case thermal resistance
- Very rugged and easy mounting
- Direct mounting to heatsink (isolated package)

Applications

- Photovoltaic Inverter
- Battery charger
- Energy storage system
- High voltage DC to DC converter

Package



Part #	Package	Marking
GCMX034B120B2H2P	B2	GCMX034B120B2H2P

Absolute Maximum Ratings, at T_J=25°C, unless otherwise specified

Characteristics	Symbol	Conditions	Values	Unit
Drain-Source Voltage	V_{rated}	V_{GS}=0V, I_{DS}=1μA	1200	V
Continuous Drain Current	I_{DS}	T_C=25°C, V_{GS}=18V, T_J=175 °C	49	A
		T_C=65°C, V_{GS}=18V, T_J=175 °C	43	
Body Diode Drain Current	I_{SD}	T_C=25°C, V_{GS}=-4.5V, T_J=175 °C	38	
Pulsed Drain Current	$I_{DS,pulse}$	T_C=25°C, V_{GS}=18V	140	
Gate Source Voltage	V_{GSmax}		-8/22	V
	V_{GSop}	Recommended operational	-4.5/18	
Power Dissipation	P_{tot}	T_C=25°C, T_J=175°C	160	W
Junction Temperature	T_J	Continuous	-40...175	°C
Case & Storage Temperature	T_C, $T_{storage}$	Continuous	-40...150	°C

Static Electrical Characteristics, at T_J=25°C, unless otherwise specified

Characteristics	**Symbol**	**Conditions**	**Values**			**Unit**
			min.	typ.	max.	
Drain-Source Breakdown Voltage	BV_{DSS}	V_{GS}=0V, I_{DS}=1mA	1200	-	-	V
Zero Gate Voltage Drain Current	I_{DSS}	V_{DS}=1200V, V_{GS}=0V	-	0.1	1	µA
		V_{DS}=1200V, V_{GS}=0V, T_J=150°C	-	1	100	
Gate-Source Leakage Current	I_{GSS+}	V_{GS}=22V, V_{DS}=0V	-	10	1000	nA
	I_{GSS-}	V_{GS}=-8V, V_{DS}=0V	-	-10	-1000	
Gate Threshold Voltage	$V_{GS(th)}$	V_{GS}=V_{DS}, I_{DS}=10mA	1.8	2.8	4	V
		V_{GS}=V_{DS}, I_{DS}=10mA, T_J=150°C	-	2	-	
Drain-Source On-Resistance	R_{DSon}*	V_{GS}=18V, I_{DS}=20A	-	34	41	mΩ
		V_{GS}=18V, I_{DS}=20A, T_J=150°C	-	53	-	
Transconductance	g_{fs}	V_{DS}=20V, I_{DS}=20A	-	13.1	-	S
		V_{DS}=20V, I_{DS}=20A, TJ=150°C	-	13.7	-	
Internal Gate Resistance	$R_{G(int)}$	f=1MHz, V_{AC}=25mV, D-S Short	-	3.2	-	Ω

*R_{DSon} including package resistance

AC Electrical Characteristics, at T_J=25°C, unless otherwise specified

Characteristics	**Symbol**	**Conditions**		**Values**			**Unit**
				min.	typ.	max.	
Input Capacitance	C_{ISS}	V_{GS}=0V, V_{DS}=800V, f=200kHz, V_{AC}=25mV		-	2.7	-	nF
Output Capacitance	C_{OSS}			-	0.14	-	
Reverse Transfer Capacitance	C_{RSS}			-	0.02	-	
Coss Stored Energy	E_{OSS}**			-	53	-	µJ
Turn-On Switching Energy	E_{ON}	T_J=25°C	V_{DD}=600V, I_{DS}=20A, $R_{G(ext)}$=3Ω, V_{GS}=-4.5/+18V, L=273µH,	-	0.17	-	mJ
		T_J=125°C		-	0.22	-	
		T_J=150°C		-	0.24	-	
Turn-Off Switching Energy	E_{OFF}	T_J=25°C		-	0.04	-	
		T_J=125°C		-	0.04	-	
		T_J=150°C		-	0.04	-	
Turn-On Delay Time	$t_{D(on)}$	V_{DD}=600V, I_{DS}=20A, $R_{G(ext)}$=3Ω, V_{GS}=-4.5/+18V, L=273µH,		-	13	-	ns
Rise Time	t_R			-	4	-	
Turn-Off Delay Time	$t_{D(off)}$			-	36	-	
Fall Time	t_F			-	13	-	
Total Gate Charge	Q_G	V_{DD}=800V, I_{DS}=20A, V_{GS}=-4.5/+18V		-	118	-	nC
Gate to Source Charge	Q_{GS}			-	37	-	
Gate to Drain Charge	Q_{GD}			-	25	-	

**E_{OSS} is calculated from C_{OSS} curve

Freewheeling Diode Characteristics, at T_J=25°C, unless otherwise specified

Characteristics	Symbol	Conditions		Values			Unit
				min.	typ.	max.	
Diode Forward Voltage	V_{SD}	V_{GS}=-5V, I_{SD}=20A		-	4.2	-	V
		V_{GS}=-5V, I_{SD}=20A, T_J=150°C		-	3.7	-	
Reverse Recovery Time	t_{RR}	T_J=25°C	I_S=20A, V_R=600V, V_{GS}=18V, di/dt=7.9A/ns	-	10	-	ns
Reverse Recovery Charge	Q_{RR}			-	223	-	nC
Peak Reverse Recovery Current	I_{RRM}			-	39	-	A
Reverse Recovery Energy	E_{RR}	T_J=25°C	I_S=20A, V_R=600V, V_{GS}=18/-4.5V, $R_{G(ext)}$=3Ω	-	0.07	-	mJ
		T_J=125°C		-	0.15	-	
		T_J=150°C		-	0.18	-	

Thermal and Package Characteristics, at T_j=25 °C, unless otherwise specified

Characteristics	Symbol	Conditions	Values			Unit
			min.	typ.	max.	
Thermal resistance, junction-case	R_{thJC}		-	0.80	0.94	°C/W
Mounting torque	M_d	M4-0.7 screws	-	2.00	2.3	N-m
Press fit pin PCB end hole diameter			0.99	-	1.09	mm
Press fit pin PCB hole drill diameter			1.12	1.15	-	mm
Press fit pin PCB hole copper thickness			25	-	50	µm
Package weight	W_t		-	40	-	g
Isolation voltage	V_{ISOL}	I_{ISOL} < 1mA,50/60 Hz, 1 min	3000	-	-	V

NTC Characteristics, at T_j=25 °C, unless otherwise specified

Characteristics	Symbol	Conditions	Values			Unit
			min.	typ.	max.	
Rated resistance	R_{NTC}	T_{NTC} = 25°C	-	5.0	-	kΩ
Resistance tolerance	ΔR/R		-5	-	5	%
Beta Value (T_2 = 50°C)	$\beta_{25/50}$		-	3380	-	k
Beta Value (T_2 = 80°C)	$\beta_{25/80}$		-	3440	-	k
Power dissipation	P_{MAX}	T_{NTC} = 25°C	-	-	50	mW

Typical Performance

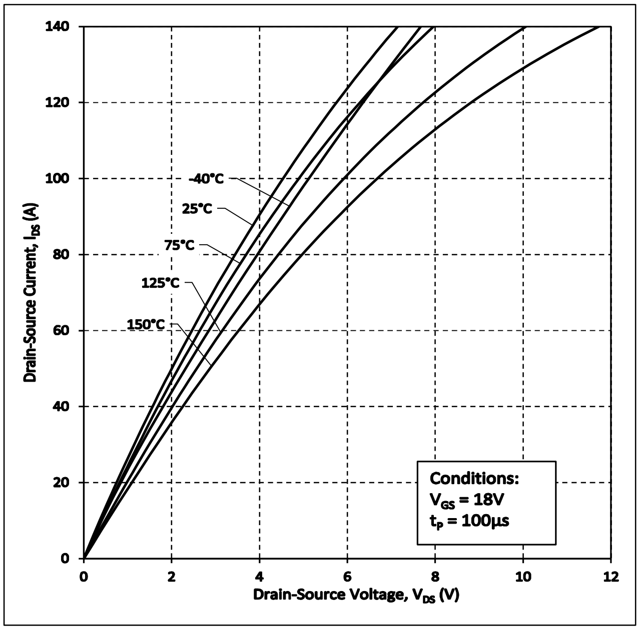


Figure 1. Output Characteristics for Various Temperatures

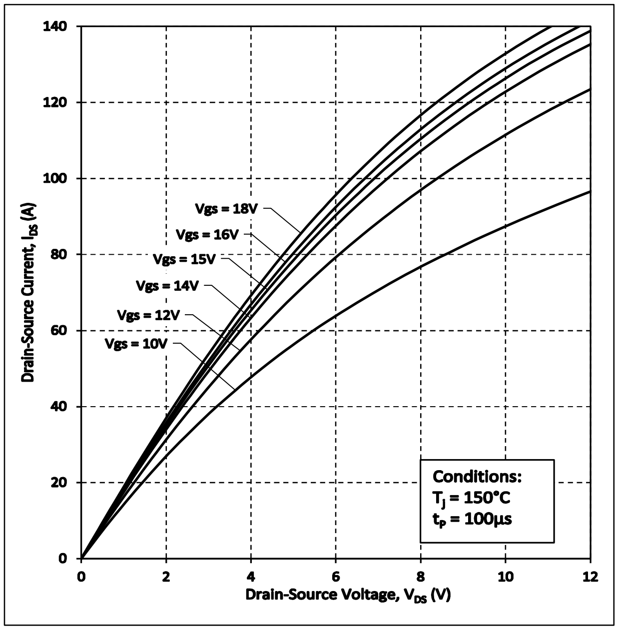


Figure 2. Output Characteristics T_J = 150°C

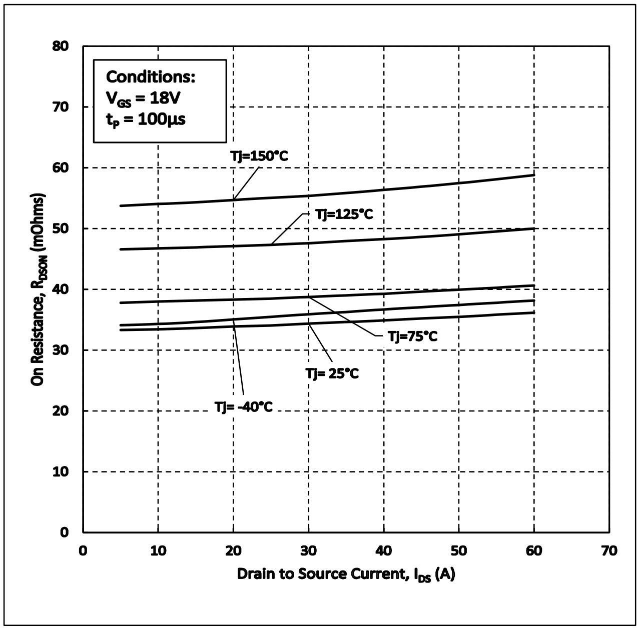


Figure 3. On-Resistance vs. Drain Current For Various Temperatures

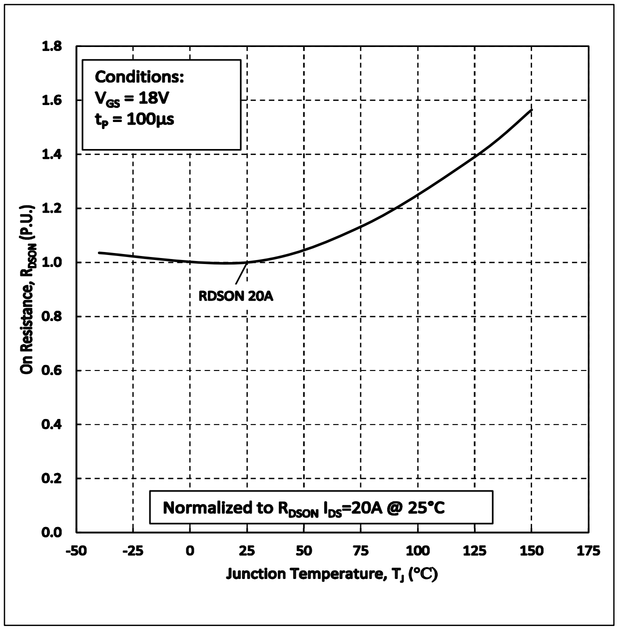


Figure 4. Normalized On-Resistance vs. Temperature

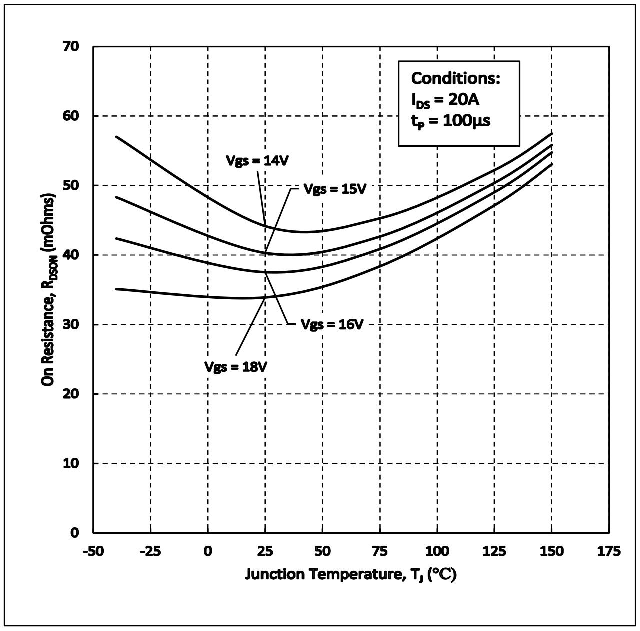


Figure 5. On-Resistance vs. Temperature For Various Gate Voltages

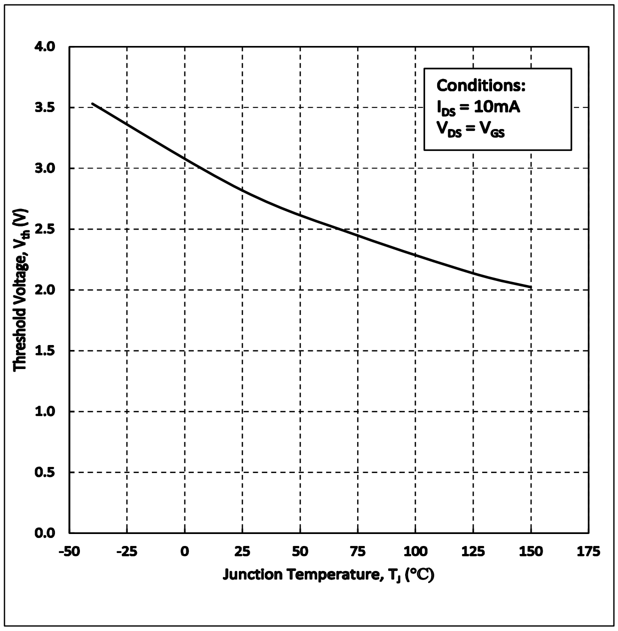


Figure 6. Threshold Voltage vs. Temperature

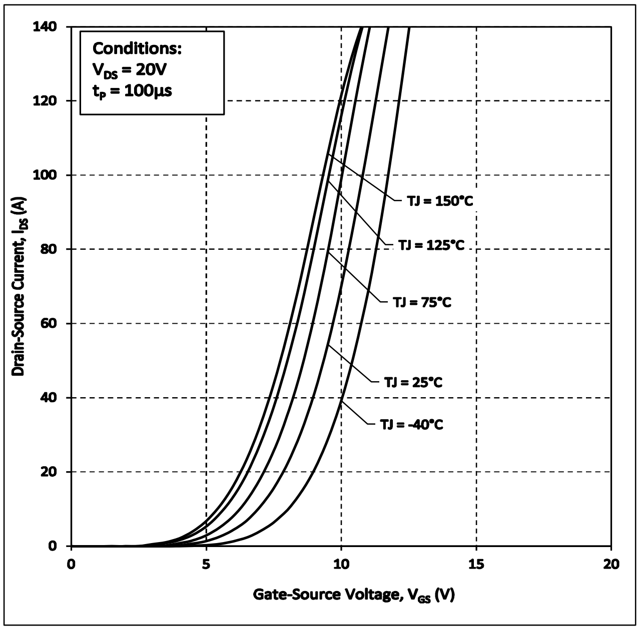


Figure 7. Transfer Characteristic for Various Junction Temperatures

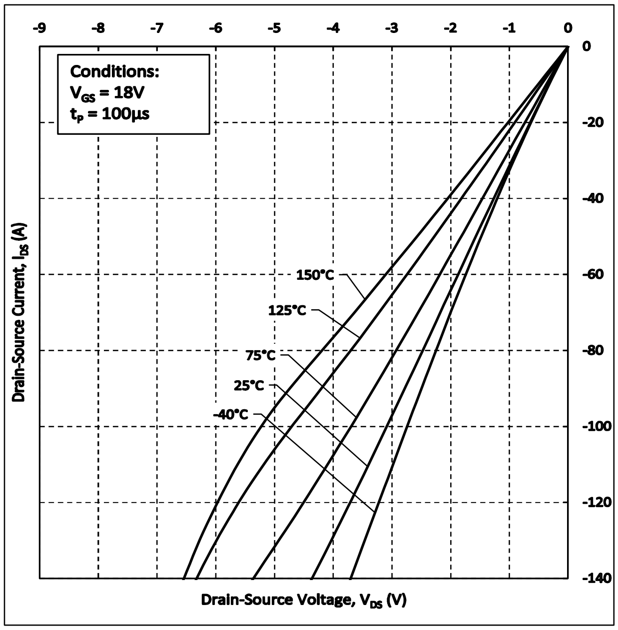


Figure 8. 3^{rd} Quadrant Characteristics at V_{GS} = 18V

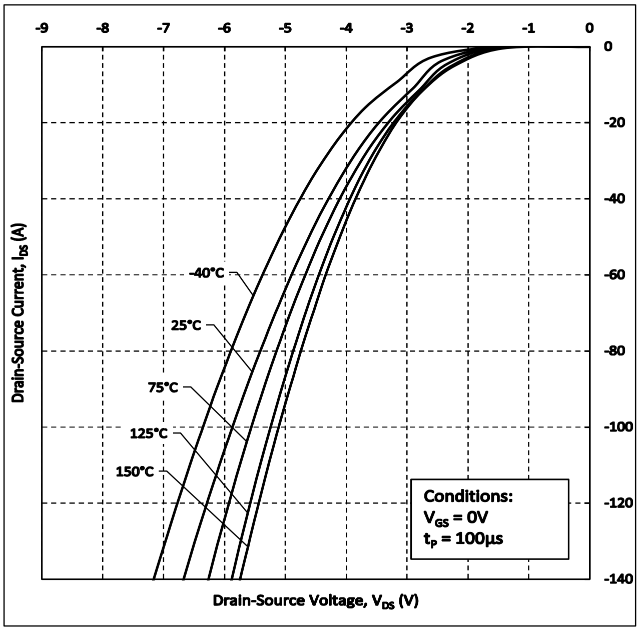


Figure 9. Body Diode Characteristics at V_{GS} = 0V

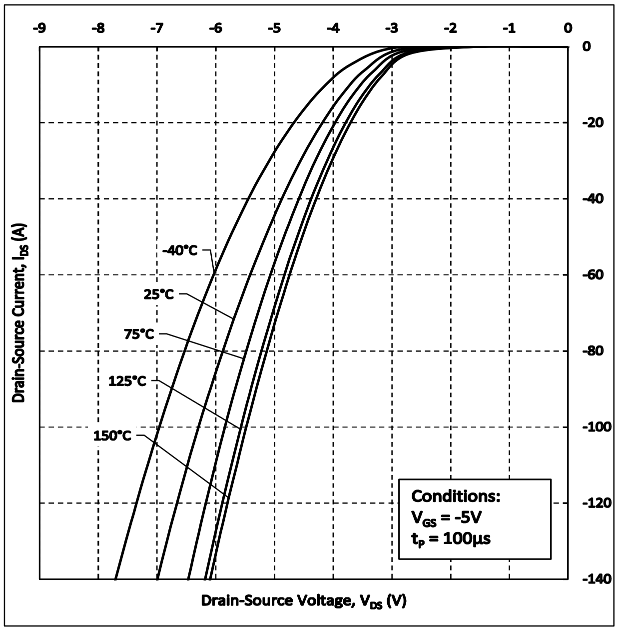


Figure 10. Body Diode Characteristics at V_{GS} = -5V

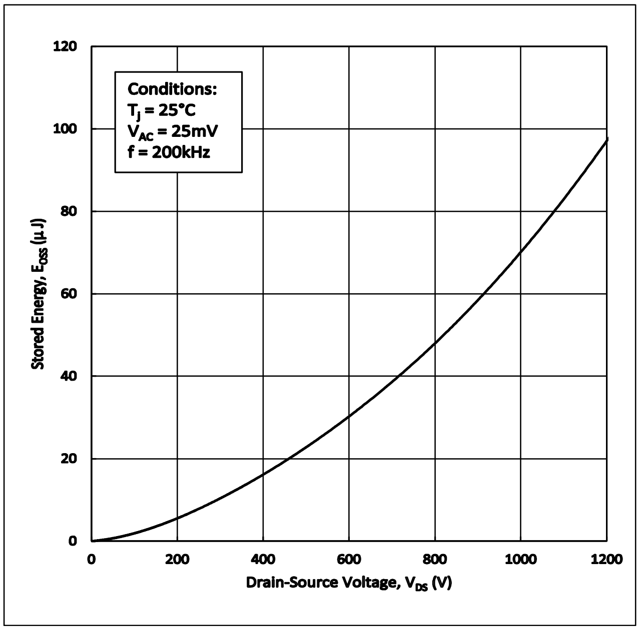


Figure 11. Output Capacitor Stored Energy

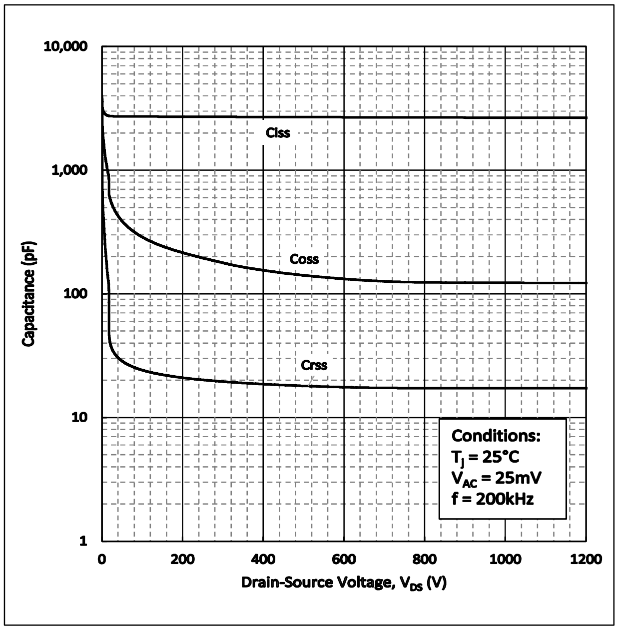


Figure 12. Capacitance vs. Drain-Source Voltage

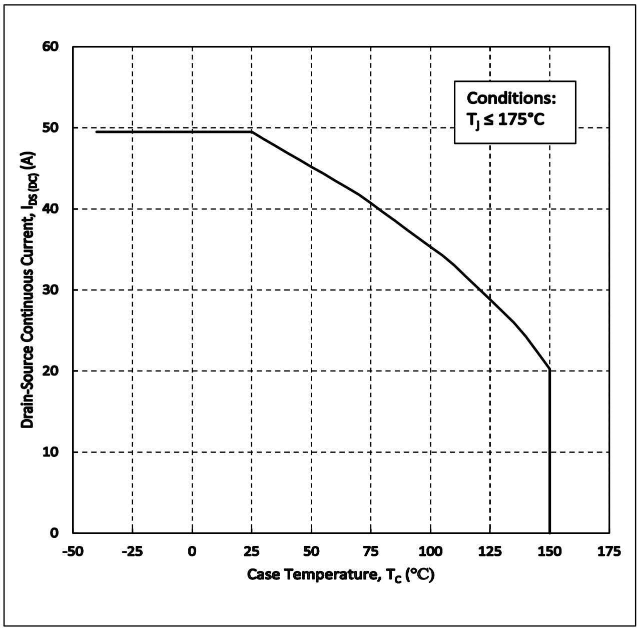


Figure 13. Continuous Drain Current Derating vs. Case Temperature

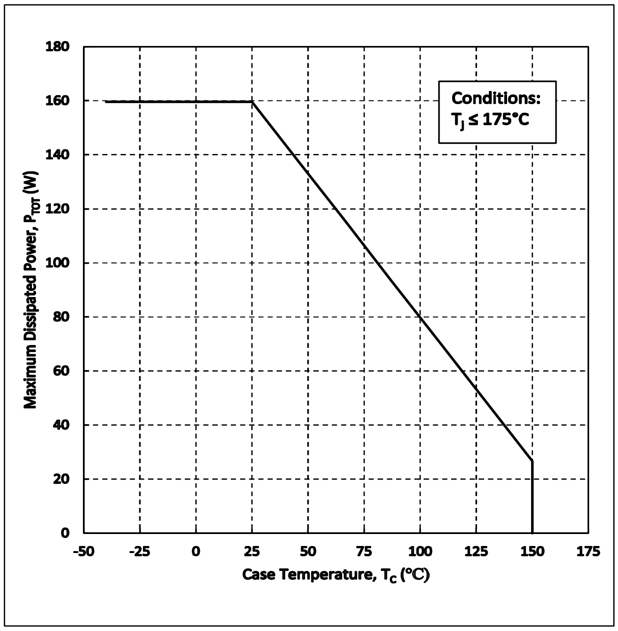


Figure 14. Maximum Power Dissipation Derating vs. Case Temperature

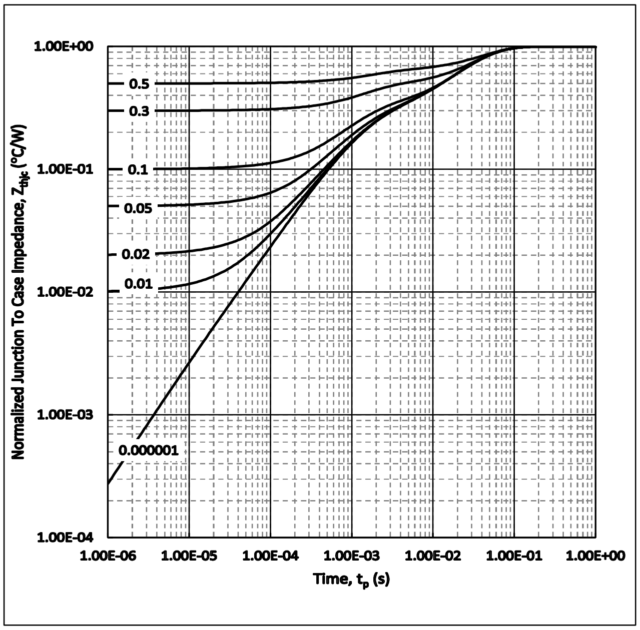


Figure 15. Transient Thermal impedance (Junction to Case)

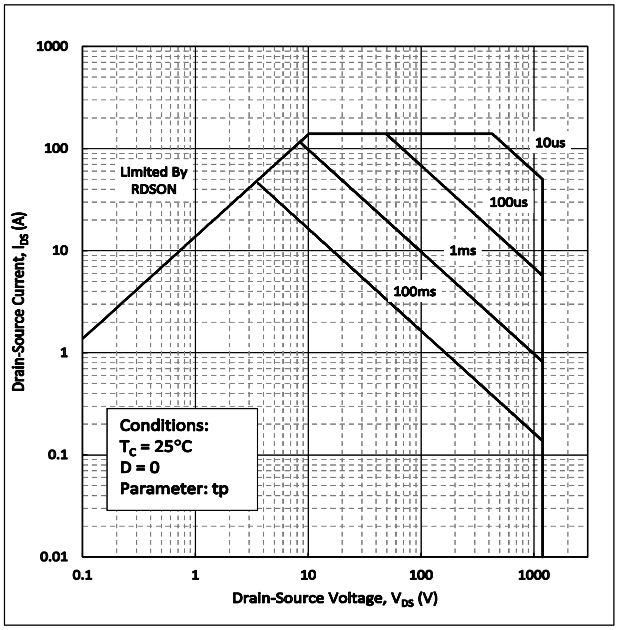


Figure 16. Safe Operating Area

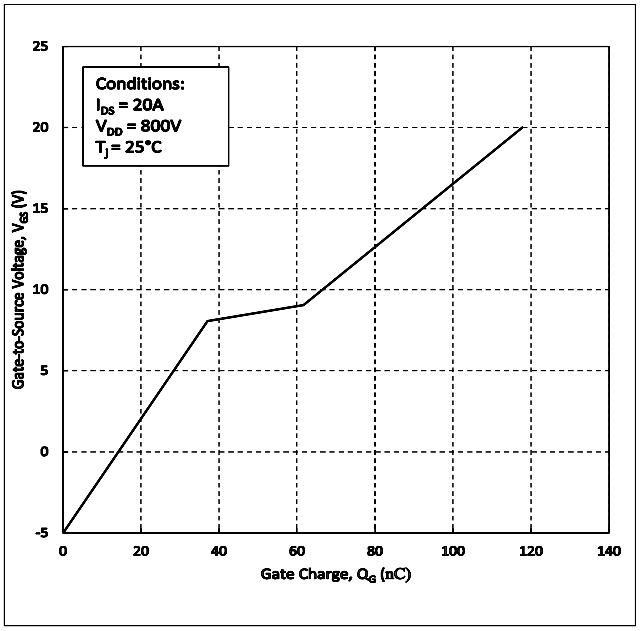


Figure 17. Gate Charge Characteristics

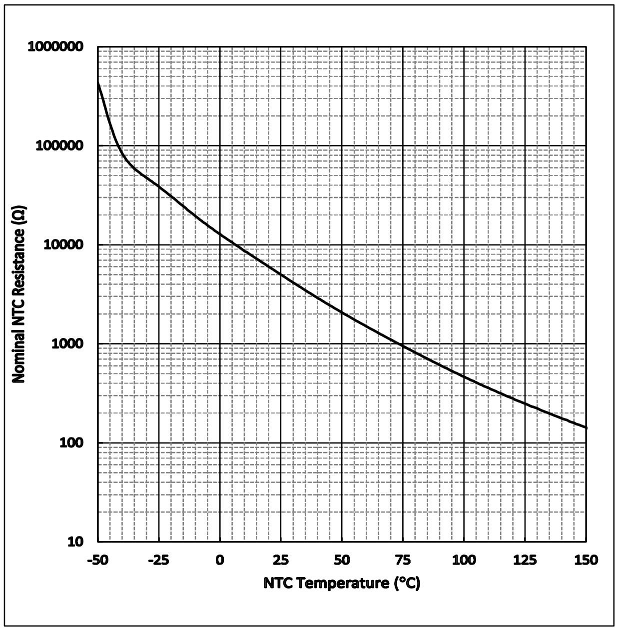


Figure 18. Nominal NTC Resistance vs. Temperature

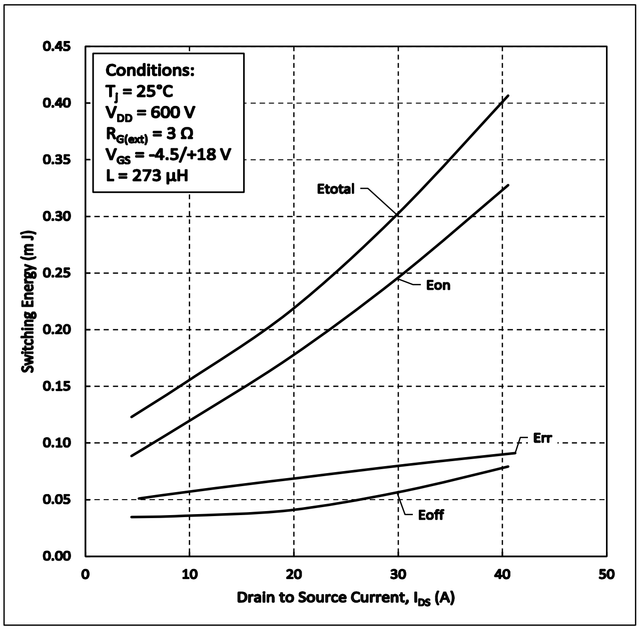


Figure 19. Clamped Inductive Switching Energy vs. Drain Current (600V)

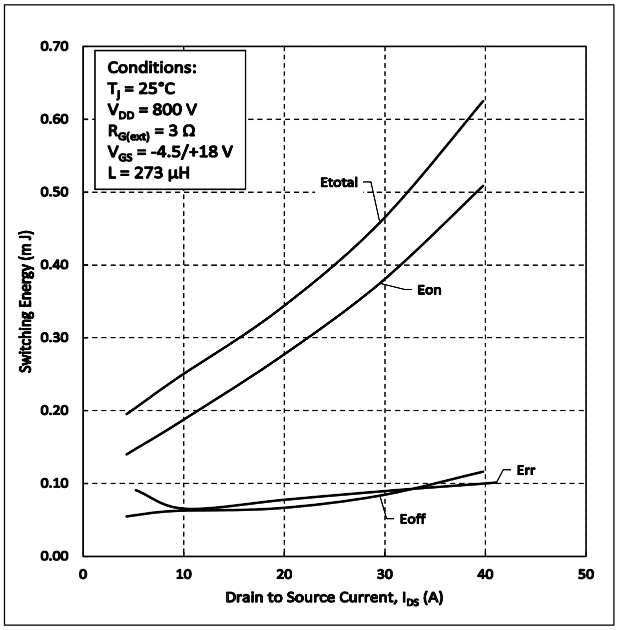


Figure 20. Clamped Inductive Switching Energy vs. Drain Current (800V)

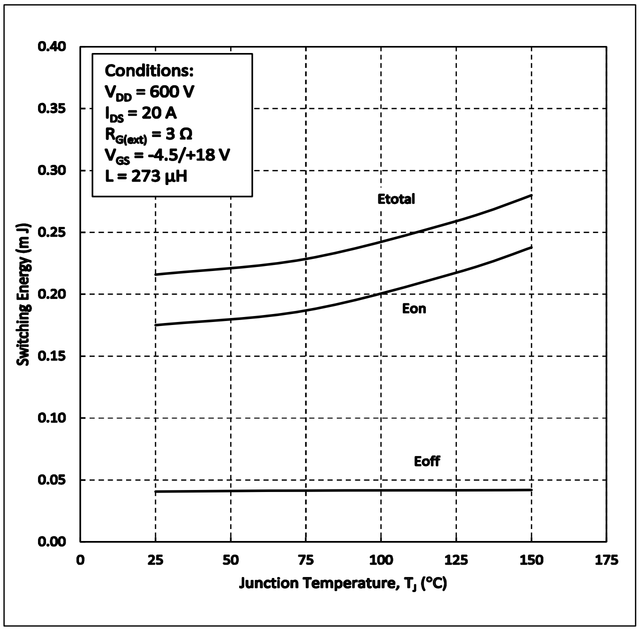


Figure 21. Clamped Inductive Switching Energy vs. Temperature

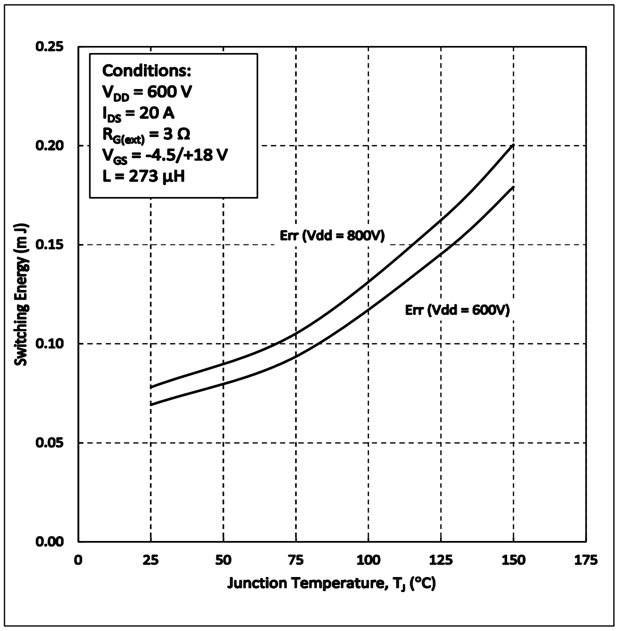


Figure 22. Reverse Recovery Energy vs. Temperature

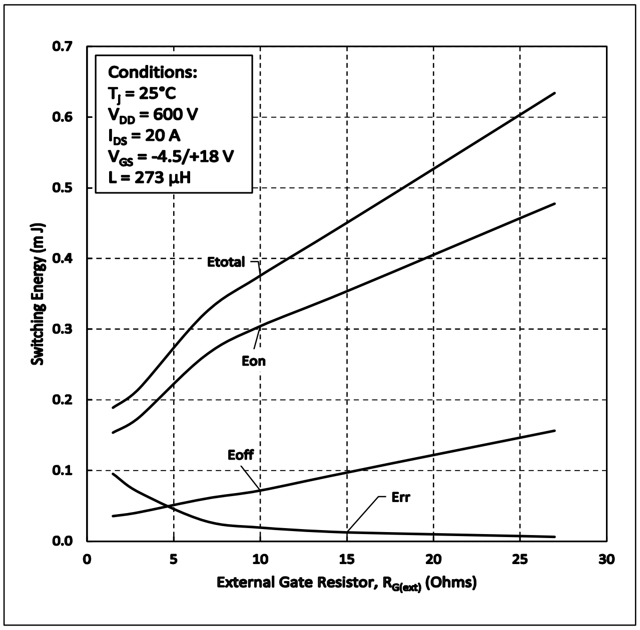


Figure 23. Clamped Inductive Switching Energy vs. $R_{G(ext)}$

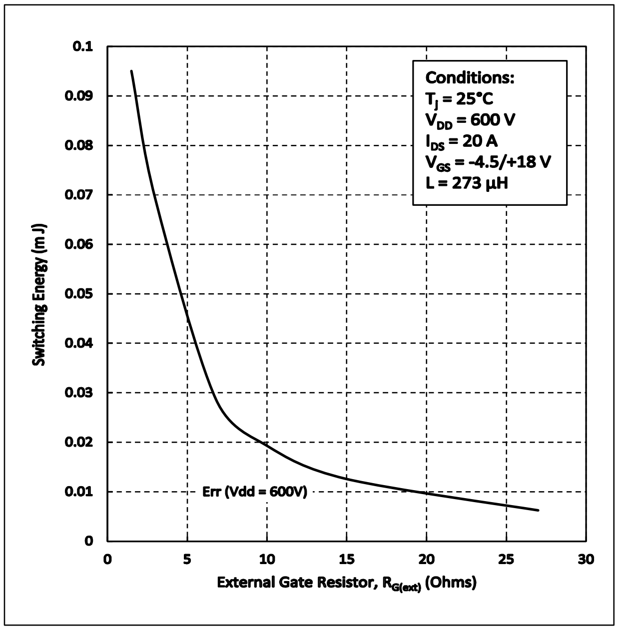


Figure 24. Reserve Recovery Energy vs. $R_{G(ext)}$

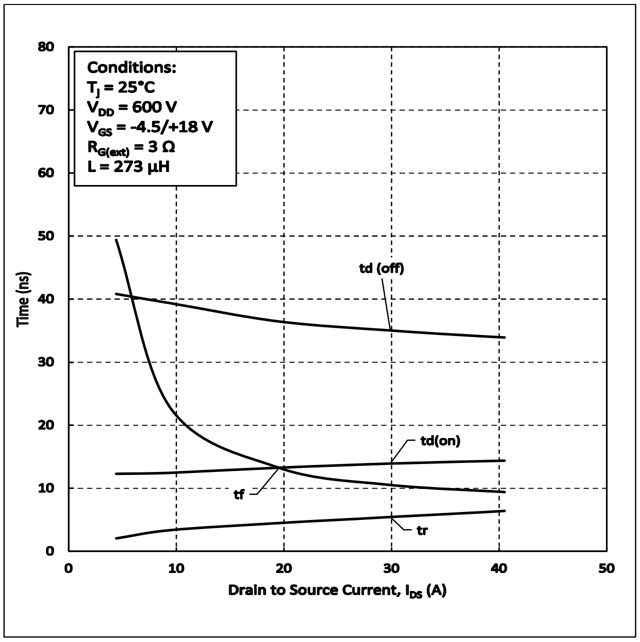


Figure 25. Switching Times vs. Drain Current

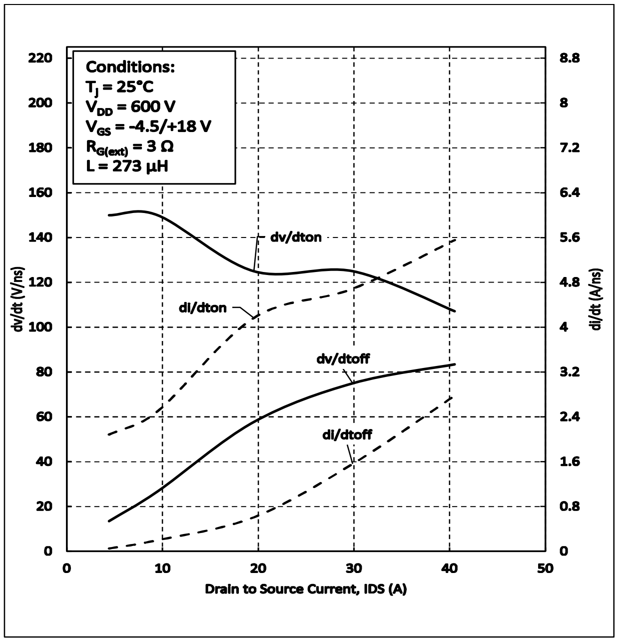


Figure 26. dv/dt and di/dt vs. Source Current

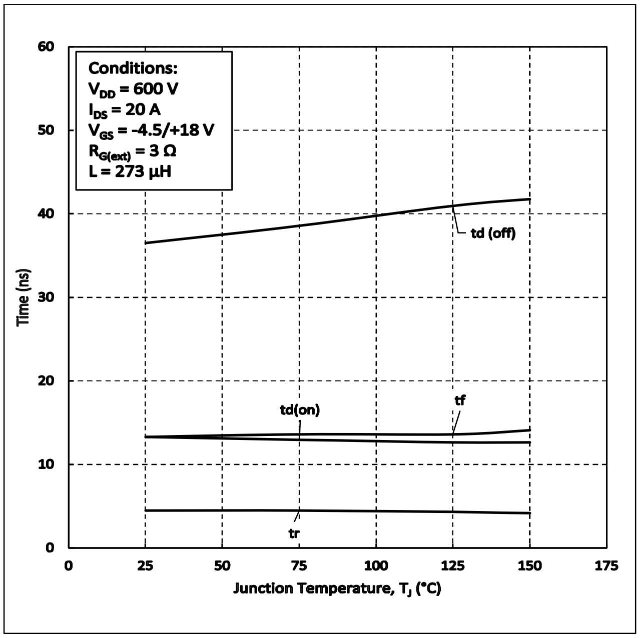


Figure 27. Switching Times vs. Temperature

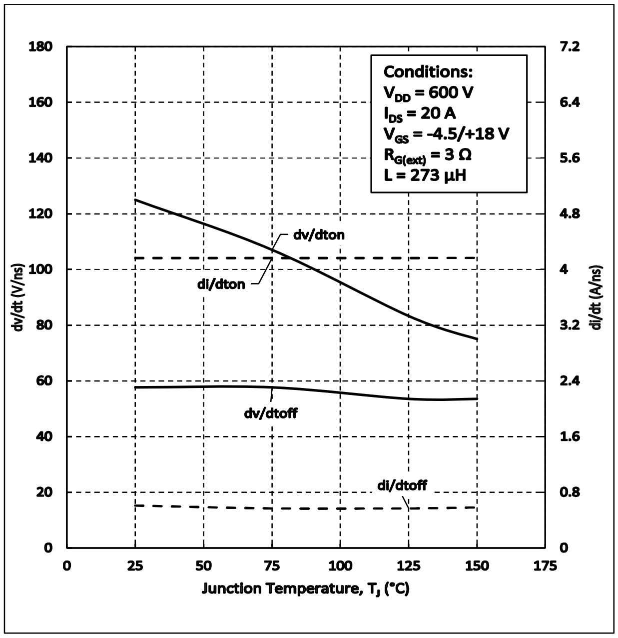


Figure 28. dv/dt and di/dt vs. Temperature

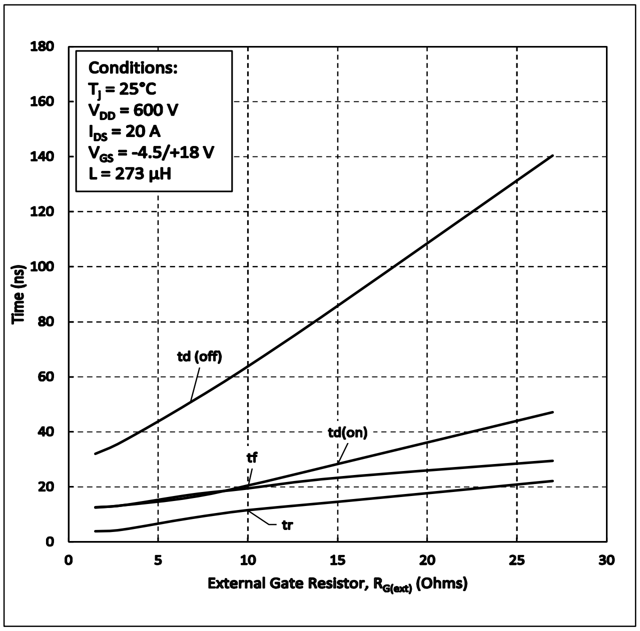


Figure 29. Switching Times vs. $R_{G(ext)}$

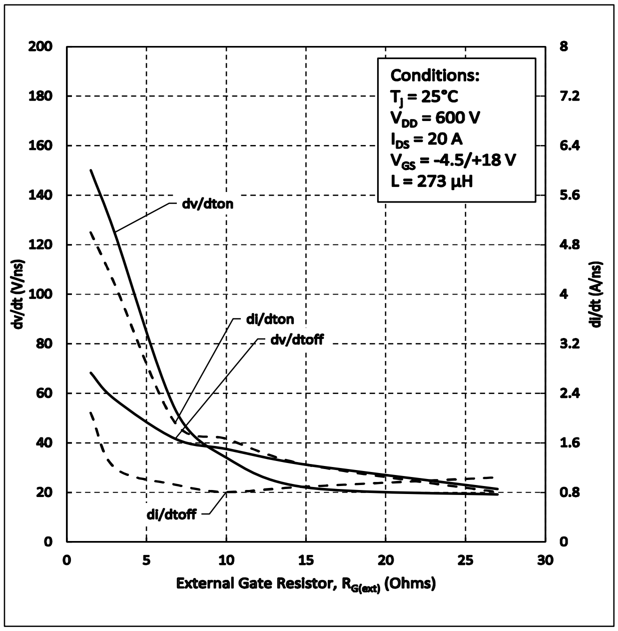


Figure 30. dv/dt and di/dt vs. $R_{G(ext)}$

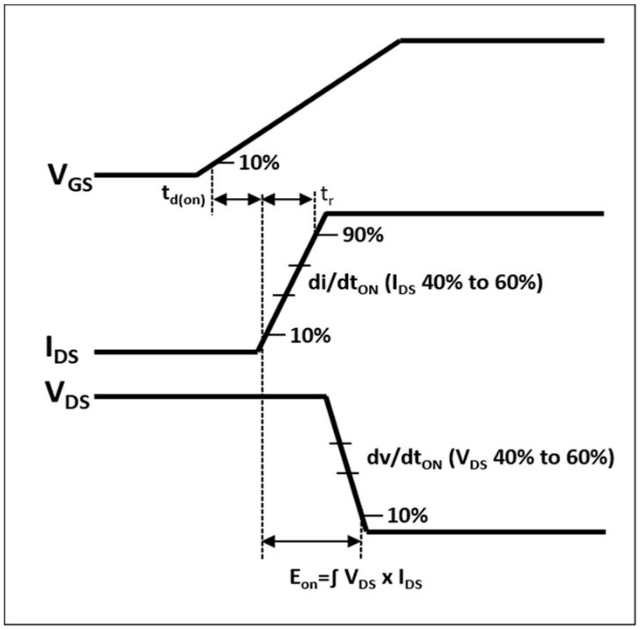


Figure 31. Turn-off Transient Definitions

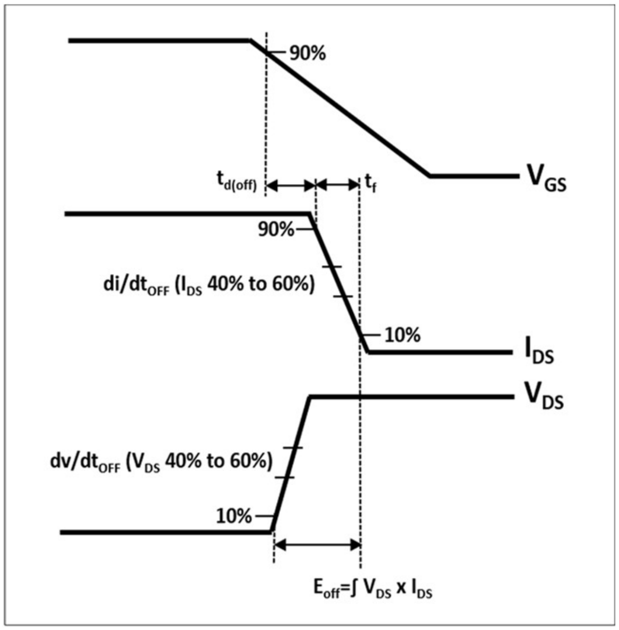


Figure 32. Turn-on Transient Definitions

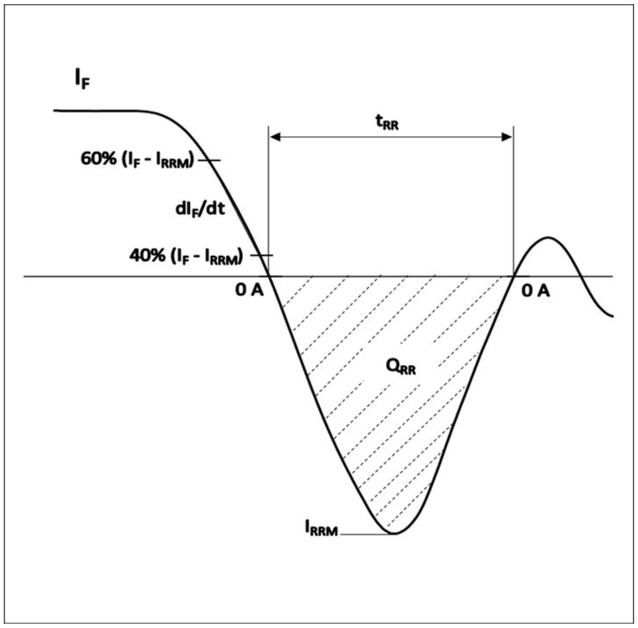
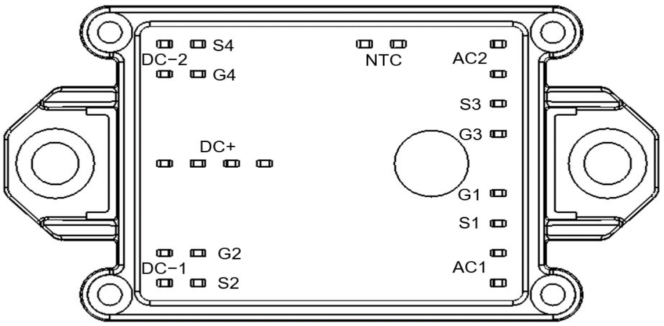
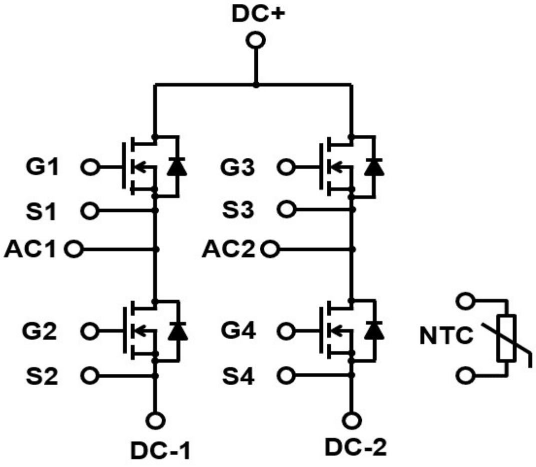


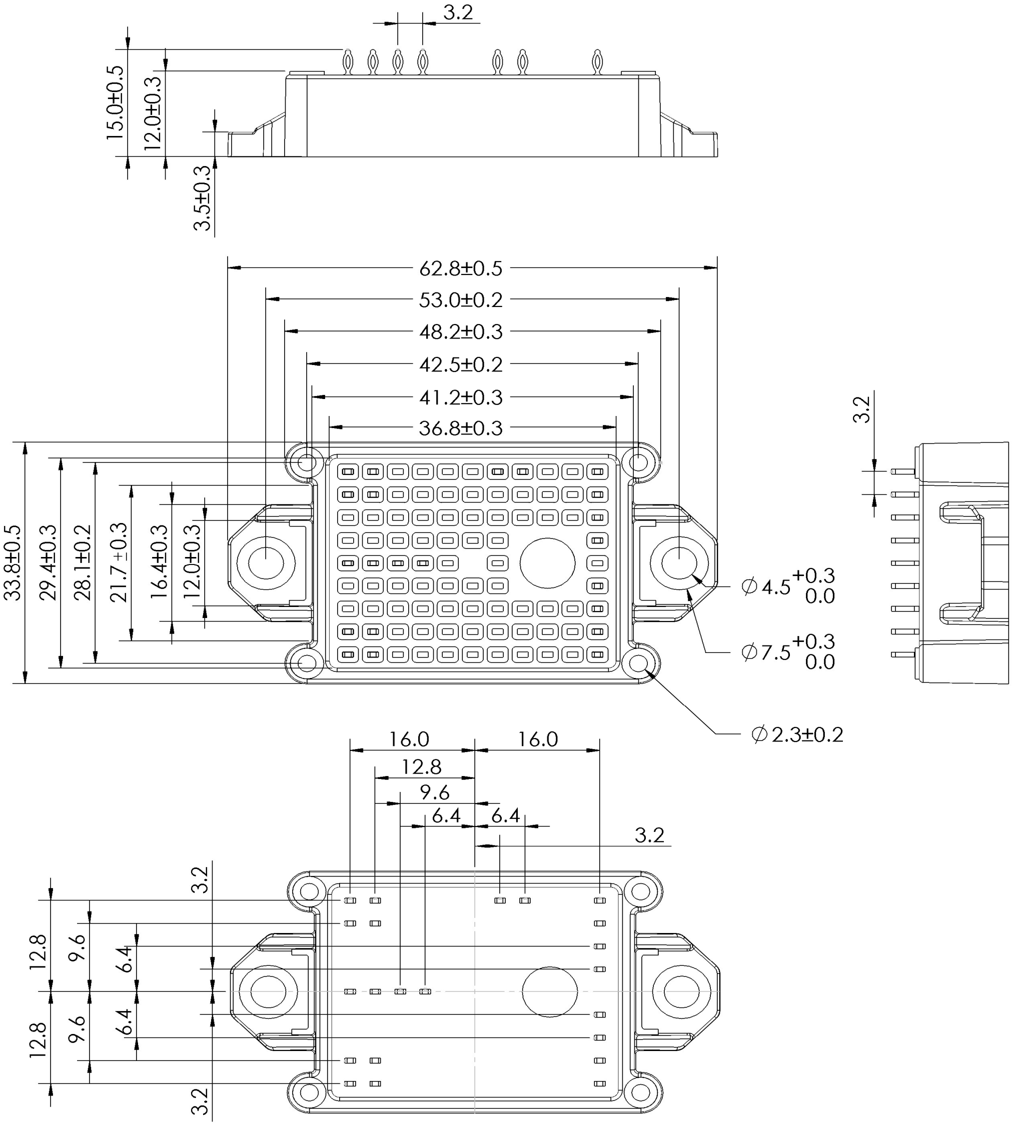
Figure 33. Reverse Recovery Definitions

Pinout and Circuit Diagram





Package Dimensions (mm) for B2H2



Revision History		
Date	Revision	Notes
10/29/2025	1.0	Initial release

Notes

RoHS Compliance

The levels of RoHS restricted materials in this product are below the maximum concentration values (also referred to as the threshold limits) permitted for such substances, or are used in an exempted application, in accordance with EU Directive 2011/65/EC (RoHS2), as implemented March, 2013. RoHS Declarations for this product can be obtained from the Product Documentation sections of www.SemiQ.com.

REACh Compliance

REACh substances of high concern (SVHC) information is available for this product. Since the European Chemicals Agency (ECHA) has published notice of their intent to frequently revise the SVHC listing for the foreseeable future,please contact our office at SemiQ Headquarters in Lake Forest, California to insure you get the most up-to-date REACh SVHC Declaration. REACh banned substance information (REACh Article 67) is also available upon request. SemiQ Inc., reserves the right to make changes to the product specifications and data in this document without notice. SemiQ products are sold pursuant to SemiQ's terms and conditions of sale in place at the time of order acknowledgement.

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