

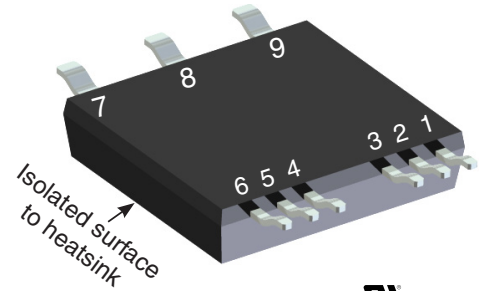
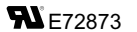
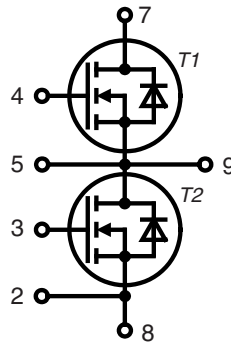
SiC Power MOSFET

$$I_{D25} = 55 \text{ A}$$

$$V_{DSS} = 1200 \text{ V}$$

$$R_{DS(on) \text{ max}} = 34 \text{ m}\Omega$$

Part number
 MCB40P1200LB

Features / Advantages:

- High speed switching with low capacitances
- High blocking voltage with low $R_{DS(on)}$
- Easy to parallel and simple to drive
- Resistant to latch-up
- Real Kelvin source connection

Applications:

- Solar inverters
- High voltage DC/DC converters
- Motor drives
- Switch mode power supplies
- UPS
- Battery chargers
- Induction heating

Package: SMPD

- DCB isolated backside
- Isolation Voltage 2500 V
- Epoxy meets UL 94V-0
- RoHS compliant
- Advanced power cycling

Disclaimer Notice

Information furnished is believed to be accurate and reliable. However, users should independently evaluate the suitability of and test each product selected for their own applications. Littelfuse products are not designed for, and may not be used in, all applications. Read complete Disclaimer Notice at www.littelfuse.com/disclaimer-electronics.

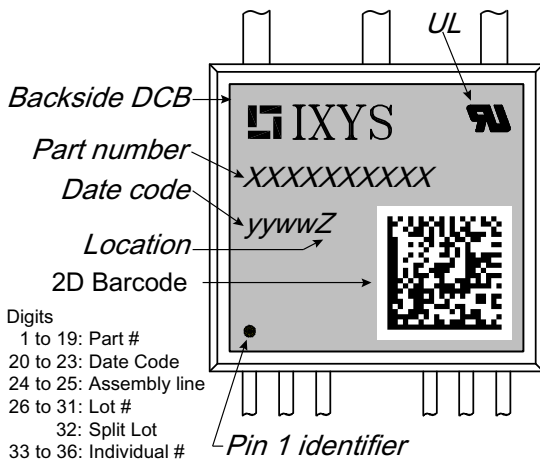
MOSFET				Ratings			
Symbol	Definitions	Conditions	min.	typ.	max.		
$V_{(BR)DSS}$	drain source breakdown voltage	$I_D = 100 \mu A$	1200				V
$V_{GS(max)}$	max transient gate source voltage		-10		+25		V
V_{GS}	continous gate source voltage	recommended operational value	-5		+20		V
I_{D25}	drain current	$V_{GS} = 20 V$				55	A
I_{D80}						44	A
I_{D100}						39	A
R_{DSon}	static drain source on resistance	$I_D = 50 A; V_{GS} = 20 V$		25	34		mΩ
				52			mΩ
$V_{GS(th)}$	gate threshold voltage	$I_D = 15 mA; V_{GS} = V_{DS}$	2.0	2.6	4.0		V
				2.1			V
I_{DSS}	drain source leakage current	$V_{DS} = 1200 V; V_{GS} = 0 V$		2	100		μA
I_{GSS}	gate source leakage current	$V_{DS} = 0 V; V_{GS} = 20 V$			0.6		μA
R_G	internal gate resistance	$f = 1 MHz, V_{AC} = 25 mV, ESR \text{ of } C_{ISS}$		1.1			Ω
C_{ISS}	input capacitance	$V_{DS} = 1000 V; V_{GS} = 0 V; f = 1 MHz \quad T_{VJ} = 25^\circ C$		2790			pF
C_{OSS}	output capacitance				220		pF
C_{rss}	reverse transfer (Miller) capacitance				15		pF
Q_g	total gate charge	$V_{DS} = 800 V; I_D = 50 A; V_{GS} = -5/20 V \quad T_{VJ} = 25^\circ C$		161			nC
Q_{gs}	gate source charge				46		nC
Q_{gd}	gate drain (Miller) charge				50		nC
$t_{d(on)}$	turn-on delay time	Inductive switching $T_{VJ} = 25^\circ C$ Free Wheeling Diode: Body Diode @ $V_{GS} = -5V$ $V_{DS} = 800 V; I_D = 50 A$ $V_{GS} = -5/20 V; R_G = 15 \Omega$ (external)		33			ns
t_r	current rise time				20		ns
$t_{d(off)}$	turn-off delay time				116		ns
t_f	current fall time				27		ns
E_{on}	turn-on energy per pulse				1.58		mJ
E_{off}	turn-off energy per pulse				0.69		mJ
$t_{d(on)}$	turn-on delay time	Inductive switching $T_{VJ} = 150^\circ C$ Free Wheeling Diode: Body Diode @ $V_{GS} = -5V$ $V_{DS} = 800 V; I_D = 50 A$ $V_{GS} = -5/20 V; R_G = 15 \Omega$ (external)		30			ns
t_r	current rise time				16		ns
$t_{d(off)}$	turn-off delay time				128		ns
t_f	current fall time				30		ns
E_{on}	turn-on energy per pulse				1.82		mJ
E_{off}	turn-off energy per pulse				0.68		mJ
R_{thJC}	thermal resistance junction to case				0.70		K/W
R_{thJH}	thermal resistance junction to heatsink	with heatsink compound; IXYS test setup			0.85		K/W

Source-Drain Diode				Ratings			
Symbol	Definitions	Conditions	min.	typ.	max.		
V_{SD}	forward voltage drop	$I_F = 25 A; V_{GS} = -5 V$		4.0			V
				3.5			V
t_{rr}	reverse recovery time	$V_{GS} = -5 V; I_F = 50 A; V_R = 800 V; \quad T_{VJ} = 25^\circ C$ Mosfet gat drive: $V_{GS} = -5/20 V; R_G = 15 \Omega$ (external)		18			ns
Q_{RM}	reverse recovery charge (intrinsic diode)				0.34		μC
I_{RM}	max. reverse recovery current				32		A
dI_F/dt	current slew rate				2900		A/ μs
t_{rr}	reverse recovery time	$V_{GS} = -5 V; I_F = 50 A; V_R = 800 V; \quad T_{VJ} = 150^\circ C$ Mosfet gat drive: $V_{GS} = -5/20 V; R_G = 15 \Omega$ (external)		29			ns
Q_{RM}	reverse recovery charge (intrinsic diode)				0.96		μC
I_{RM}	max. reverse recovery current				50		A
dI_F/dt	current slew rate				3400		A/ μs

Note:

 When using SiC Body Diode the maximum recommended $V_{GS} = -5V$

Package SMPD			Ratings			
Symbol	Definitions	Conditions	min.	typ.	max.	
I_{RMS}	RMS current	wide terminal standard terminal			100 60	A A
T_{stg}	storage temperature		-55		150	°C
T_{op}	operation temperature		-55		150	°C
T_{vJ}	virtual junction temperature		-55		175	°C
Weight				8		g
F_C	mounting force with clip		40		130	N
$d_{Spp/App}$	creepage distance on surface /	terminal to terminal	1.6			mm
$d_{Spb/Apb}$	striking distance through air	terminal to backside	4.0			mm
V_{ISOL}	isolation voltage	$t = 1$ second $t = 1$ minute		3000 2500		V V
						50/60 Hz; RMS; $I_{ISOL} < 1$ mA



Digits

1 to 19: Part #

20 to 23: Date Code

24 to 25: Assembly line

26 to 31: Lot #

32: Split Lot

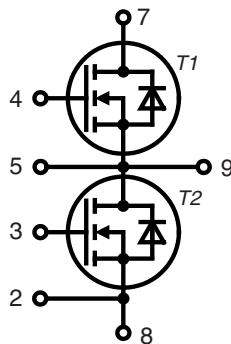
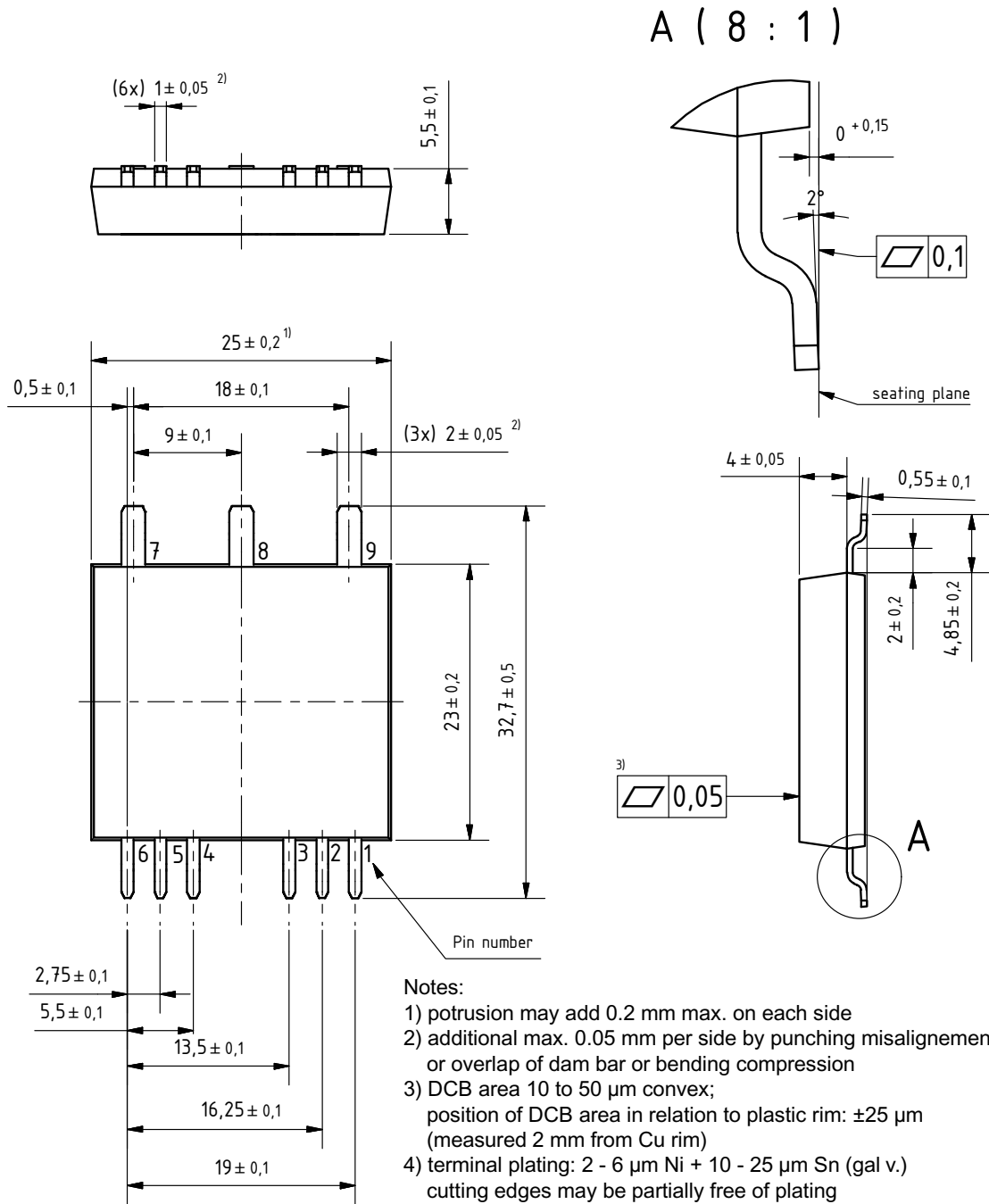
33 to 36: Individual #

Part number

M = Mosfet
 C = SiC MOSFET
 B = Generation 2
 40 = Current Rating [A]
 P = Phase leg
 1200 = Reverse Voltage [V]
 LB = SMPD-B

Ordering	Part Name	Marking on Product	Delivering Mode	Base Qty	Ordering Code
Standard	MCB40P1200LB-TUB	MCB40P1200LB	Tube	20	MCB40P1200LB-TUB
Alternativ	MCB40P1200LB-TRR	MCB40P1200LB	Tape&Reel	200	MCB40P1200LB-TRR

Outlines SMPD-B



Curves

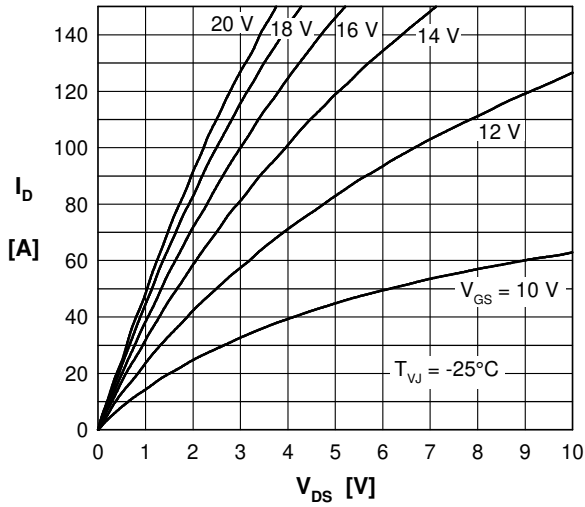


Fig. 1 Typical output characteristics (-25°C)

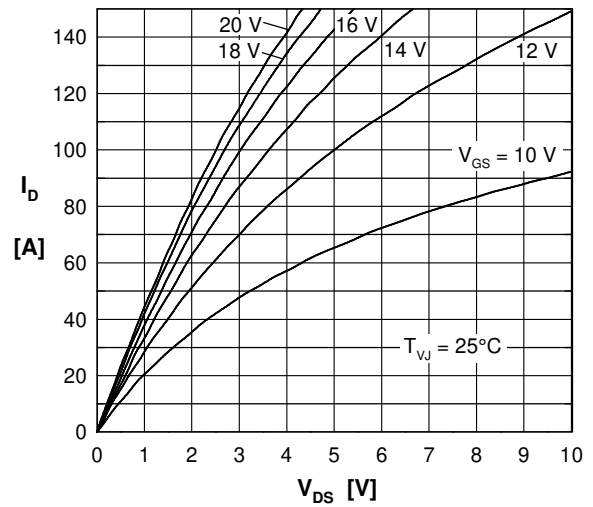


Fig. 2 Typical output characteristics (25°C)

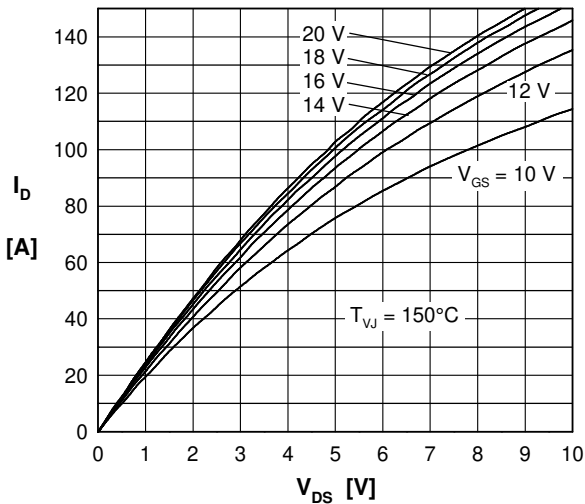


Fig. 3 Typical output characteristics (150°C)

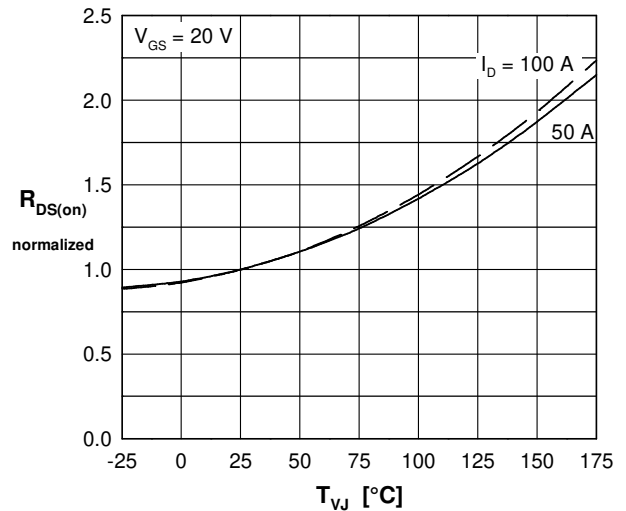


Fig. 4 $R_{DS(on)}$ normalized vs. junction temperature T_{VJ}

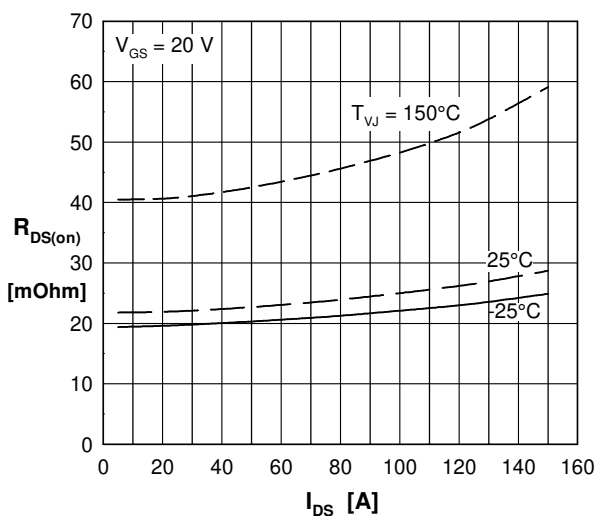


Fig. 5 $R_{DS(on)}$ versus drain current

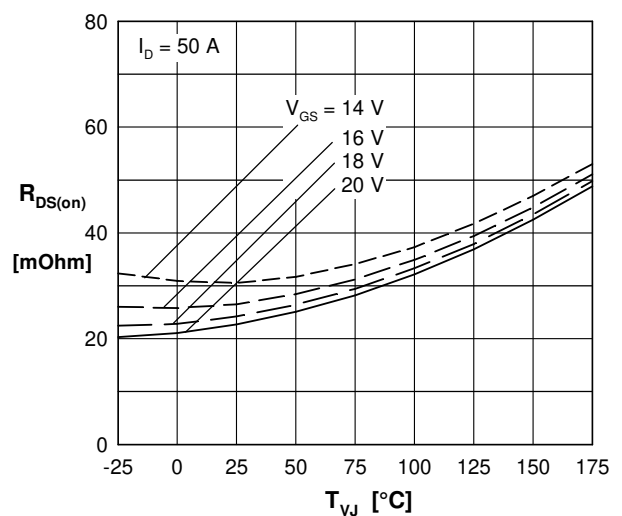


Fig. 6 $R_{DS(on)}$ versus junction temperature T_{VJ}

Curves

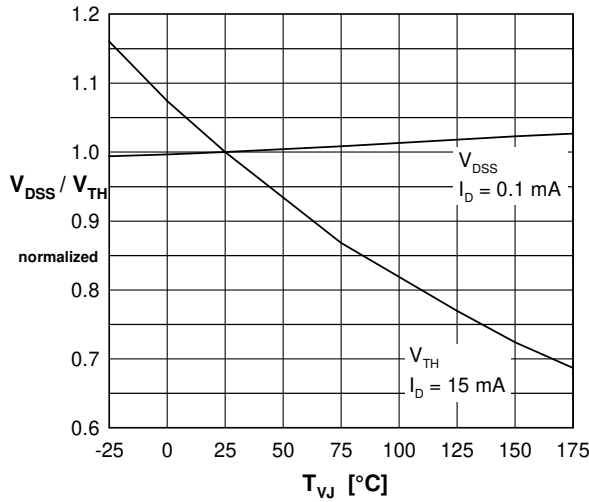


Fig. 7 Norm. breakdown V_{DSS} & threshold voltage V_{TH} versus junction temperature T_{VJ}

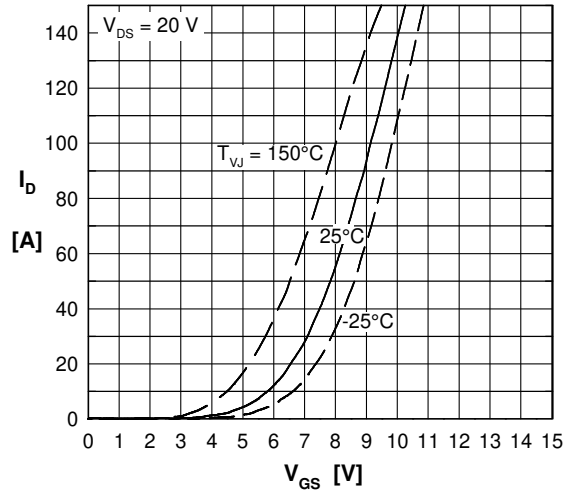


Fig. 8 Typical transfer characteristics

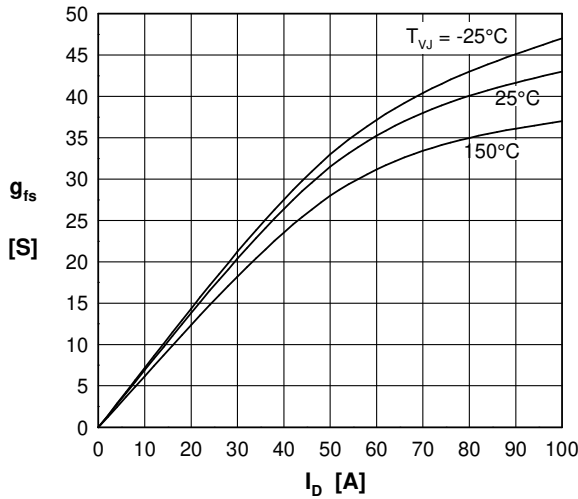


Fig. 9 Typical forward transconductance

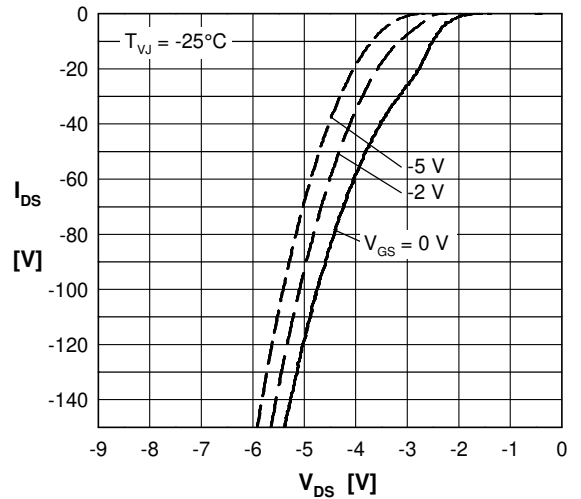


Fig. 10 Forward voltage drop of intrinsic diode versus V_{DS} measured at -25°C

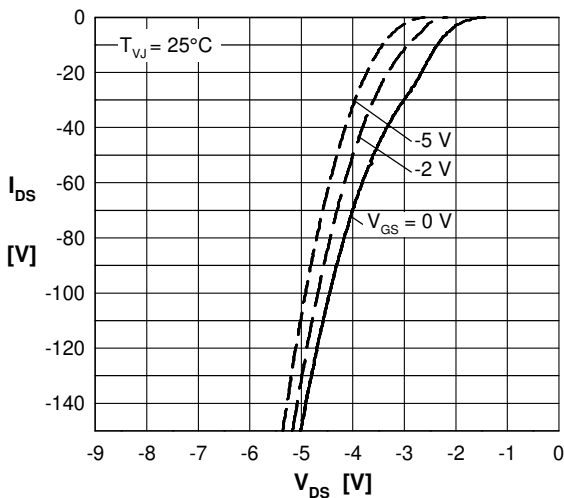


Fig. 11 Forward voltage drop of intrinsic diode versus V_{DS} measured at 25°C

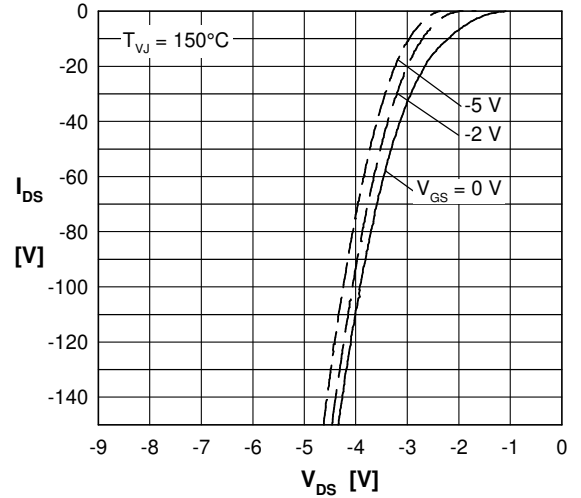


Fig. 12 Forward voltage drop of intrinsic diode versus V_{DS} measured at 150°C

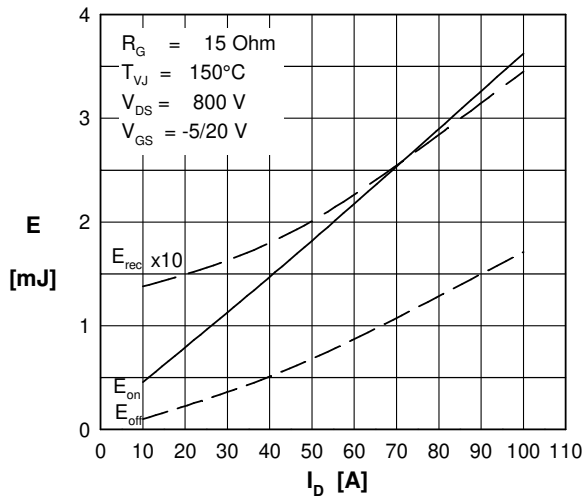
Curves


Fig. 13 Typical switching energy versus drain current

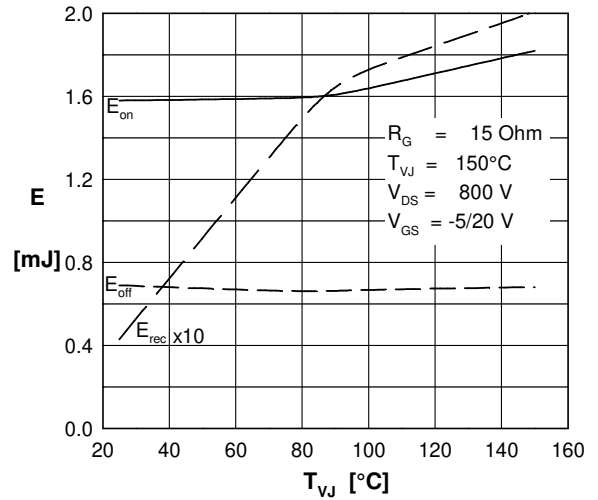


Fig. 14 Typical switching energy versus temperature

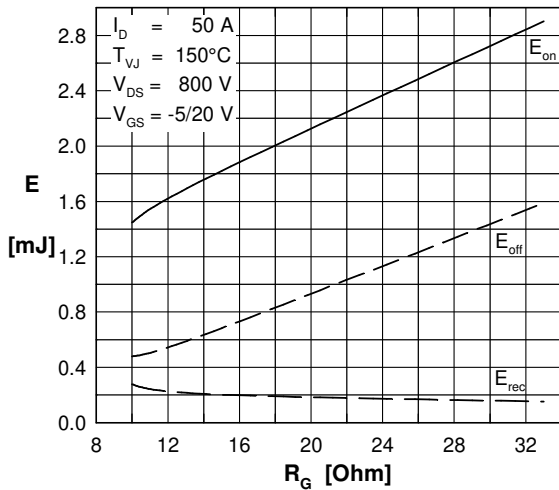


Fig. 15 Typical switching energy versus external gate resistor

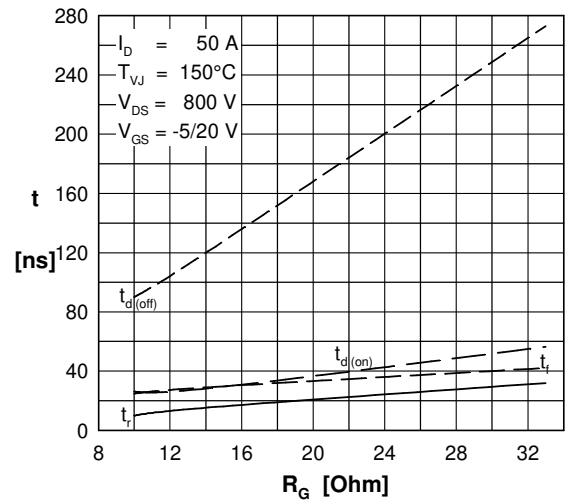


Fig. 16 Typical switching time versus external gate resistor

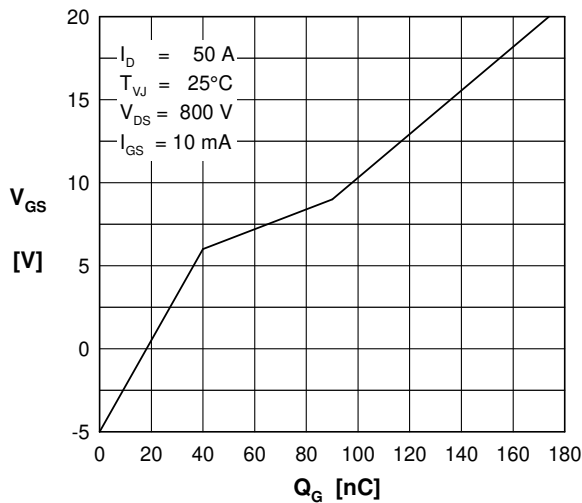


Fig. 17 Typical turn on gate charge, trendline

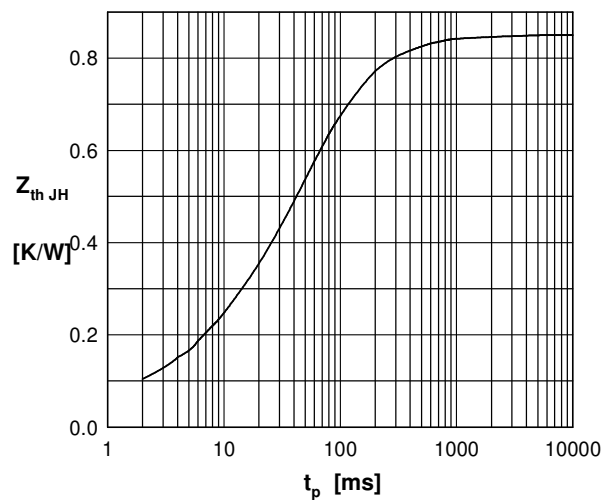


Fig. 18 Typical transient thermal impedance junction to heatsink