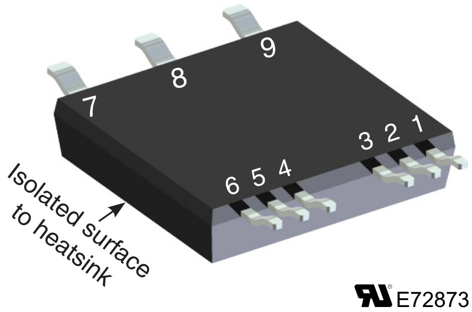
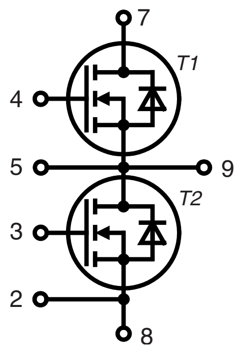
SiC Power MOSFET

I_{D25} = 55 A
V_{DSS} = 1200 V
$R_{DS(on)\ max}$ = 34 mΩ

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

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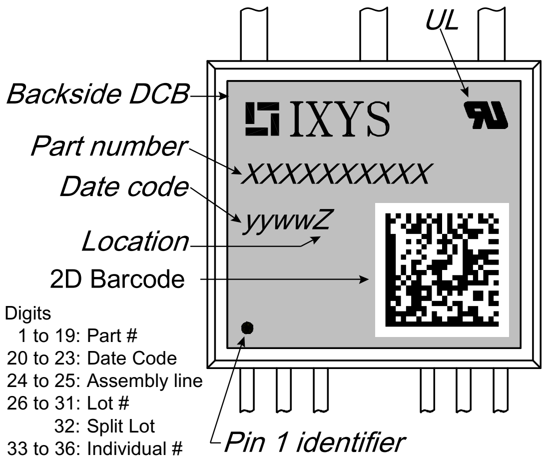
MOSFET				Ratings			
Symbol	**Definitions**	**Conditions**		**min.**	**typ.**	**max.**	
$V_{(BR)DSS}$	*drain source breakdown voltage*	I_D = 100 µA		1200			V
$V_{GS(max)}$ V_{GS}	*max transient gate source voltage* *continous gate source voltage*	recommended operational value		-10 -5		+25 +20	V V
I_{D25} I_{D80} I_{D100}	*drain current*	V_{GS} = 20 V	T_C = 25°C T_C = 80°C T_C = 100°C			55 44 39	A A A
R_{DSon}	*static drain source on resistance*	I_D = 50 A; V_{GS} = 20 V	T_{VJ} = 25°C T_{VJ} = 175°C		25 52	34	mΩ mΩ
$V_{GS(th)}$	*gate threshold voltage*	I_D = 15 mA; V_{GS} = V_{DS}	T_{VJ} = 25°C T_{VJ} = 175°C	2.0	2.6 2.1	4.0	V V
I_{DSS}	*drain source leakage current*	V_{DS} = 1200 V; V_{GS} = 0 V	T_{VJ} = 25°C		2	100	µA
I_{GSS}	*gate source leakage current*	V_{DS} = 0 V; V_{GS} = 20 V	T_{VJ} = 25°C			0.6	µA
R_G	*internal gate resistance*	f = 1 MHz, V_{AC} = 25 mV, ESR of C_{ISS}			1.1		Ω
C_{iss} C_{oss} C_{rss}	*input capacitance* *output capacitance* *reverse transfer (Miller) capacitance*	V_{DS} = 1000 V; V_{GS} = 0 V; f = 1 MHz	T_{VJ} = 25°C		2790 220 15		pF pF pF
Q_g Q_{gs} Q_{gd}	*total gate charge* *gate source charge* *gate drain (Miller) charge*	V_{DS} = 800 V; I_D = 50 A; V_{GS} = -5/20 V	T_{VJ} = 25°C		161 46 50		nC nC nC
$t_{d(on)}$ t_r $t_{d(off)}$ t_f E_{on} E_{off}	*turn-on delay time* *current rise time* *turn-off delay time* *current fall time* *turn-on energy per pulse* *turn-off energy per pulse*	Inductive switching Free Wheeling Diode: Body Diode @ V_{GS} = -5V V_{DS} = 800 V; I_D = 50 A V_{GS} = -5/20 V; R_G = 15 Ω (external)	T_{VJ} = 25°C		33 20 116 27 1.58 0.69		ns ns ns ns mJ mJ
$t_{d(on)}$ t_r $t_{d(off)}$ t_f E_{on} E_{off}	*turn-on delay time* *current rise time* *turn-off delay time* *current fall time* *turn-on energy per pulse* *turn-off energy per pulse*	Inductive switching Free Wheeling Diode: Body Diode @ V_{GS} = -5V V_{DS} = 800 V; I_D = 50 A V_{GS} = -5/20 V; R_G = 15 Ω (external)	T_{VJ} = 150°C		30 16 128 30 1.82 0.68		ns ns ns ns mJ mJ
R_{thJC} R_{thJH}	*thermal resistance junction to case* *thermal resistance junction to heatsink*	with heatsink compound; IXYS test setup			 0.85	0.70	K/W 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	T_{VJ} = 25°C T_{VJ} = 175°C		4.0 3.5		V V
t_{rr} Q_{RM} I_{RM} dI_F/dt	*reverse recovery time* *reverse recovery charge (intrinsic diode)* *max. reverse recovery current* *current slew rate*	V_{GS} = -5 V; I_F = 50 A; V_R = 800 V; Mosfet gat drive: V_{GS} = -5/20 V; R_G = 15 Ω (external)	T_{VJ} = 25°C		18 0.34 32 2900		ns µC A A/µs
t_{rr} Q_{RM} I_{RM} dI_F/dt	*reverse recovery time* *reverse recovery charge (intrinsic diode)* *max. reverse recovery current* *current slew rate*	V_{GS} = -5 V; I_F = 50 A; V_R = 800 V; Mosfet gat drive: V_{GS} = -5/20 V; R_G = 15 Ω (external)	T_{VJ} = 150°C		29 0.96 50 3400		ns µC A 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} T_{op} T_{VJ}	*storage temperature* *opertation temperature* *virtual junction temperature*		-55 -55 -55		150 150 175	°C °C °C
Weight				8		g
F_C	*mounting force with clip*		40		130	N
$d_{Spp/App}$ $d_{Spb/Apb}$	*creepage distance on surface / striking distance through air*	terminal to terminal terminal to backside	1.6 4.0			mm mm
V_{ISOL}	*isolation voltage*	t = 1 second t = 1 minute 50/60 Hz; RMS; I_{ISOL} < 1 mA		3000 2500		V V



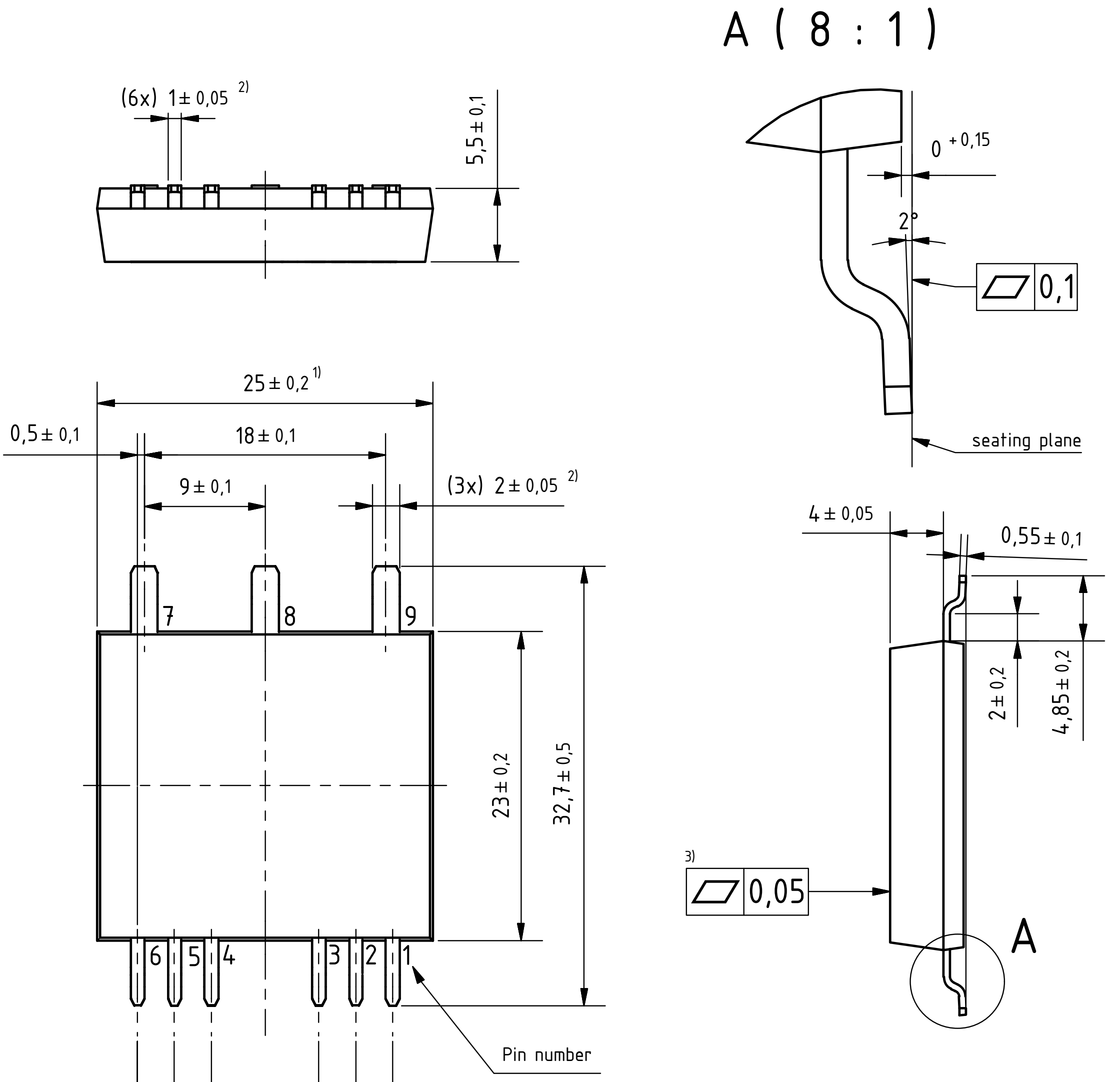
Digits
1 to 19: Part #
20 to 23: Date Code
24 to 25: Assembly line
26 to 31: Lot #
32: Split Lot
33 to 36: Individual #

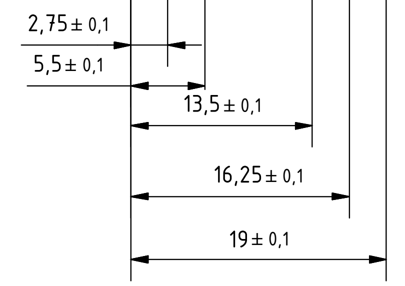
Part number

- 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

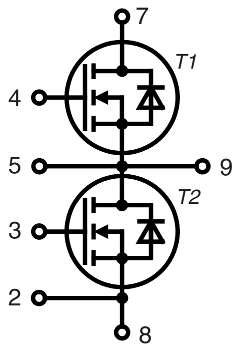
Outlines SMPD-B





Notes:
1) potrusion may add 0.2 mm max. on each side
2) additional max. 0.05 mm per side by punching misalignement or overlap of dam bar or bending compression
3) DCB area 10 to 50 µm convex; position of DCB area in relation to plastic rim: ±25 µm (measured 2 mm from Cu rim)
4) terminal plating: 2 - 6 µm Ni + 10 - 25 µm Sn (gal v.) cutting edges may be partially free of plating

Dimensions in mm
(1 mm = 0.0394“)



Curves

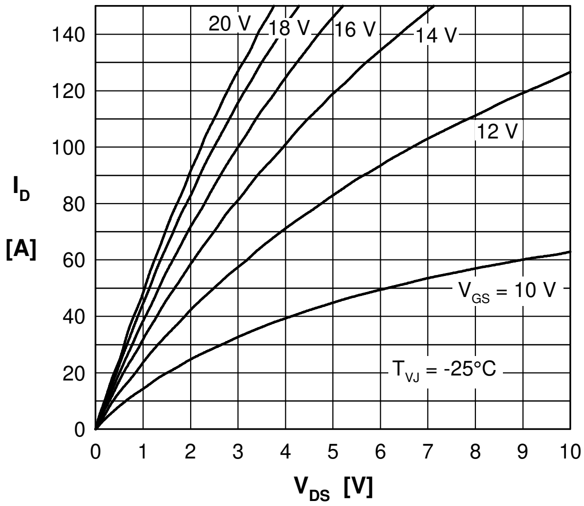


Fig. 1 Typical output characteristics (-25°C)

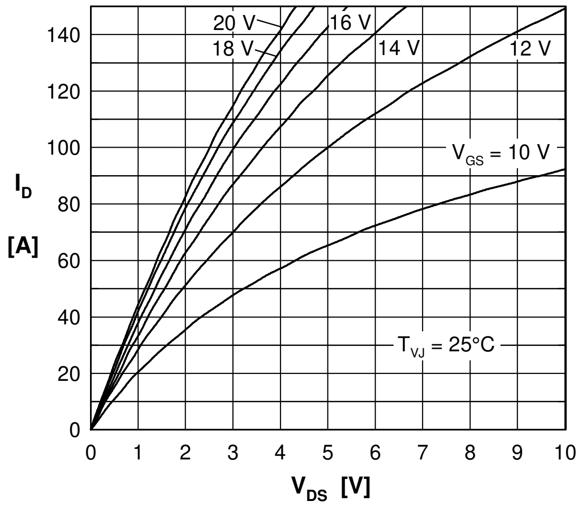


Fig. 2 Typical output characteristics (25°C)

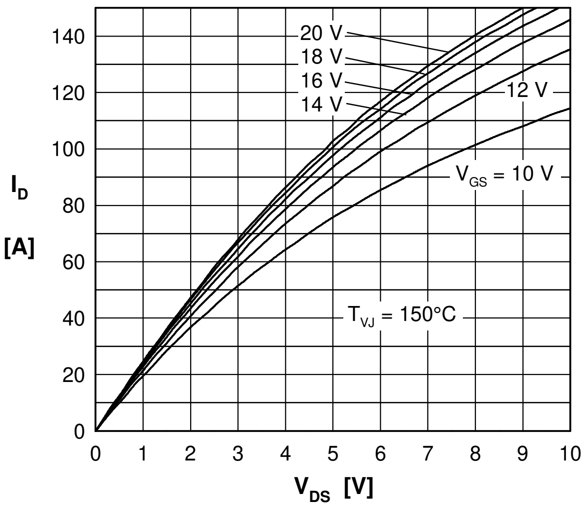


Fig. 3 Typical output characteristics (150°C)

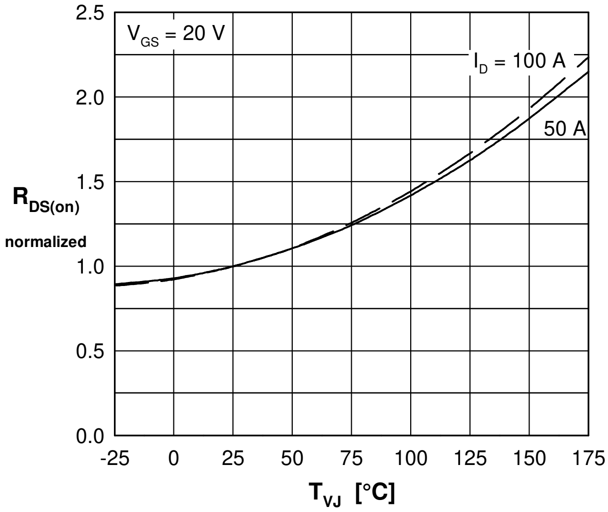


Fig. 4 $R_{DS(on)}$ normalized vs. junction temperature T_{VJ}

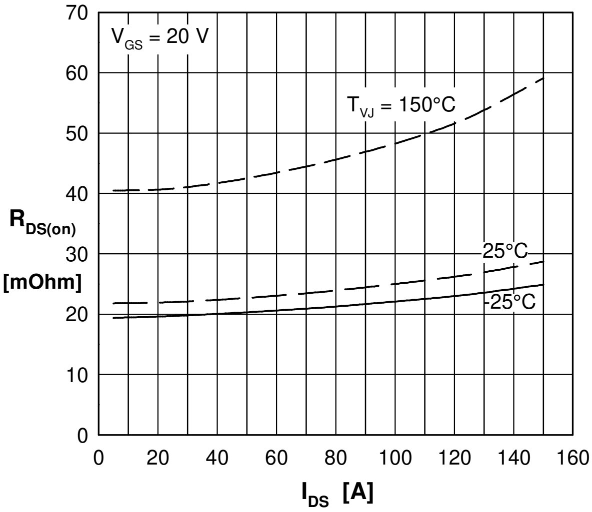


Fig. 5 $R_{DS(on)}$ versus drain current

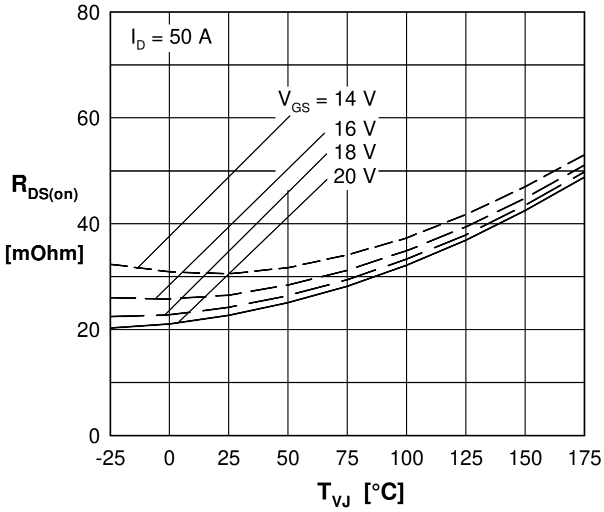


Fig. 6 $R_{DS(on)}$ versus junction temperature T_{VJ}

Curves

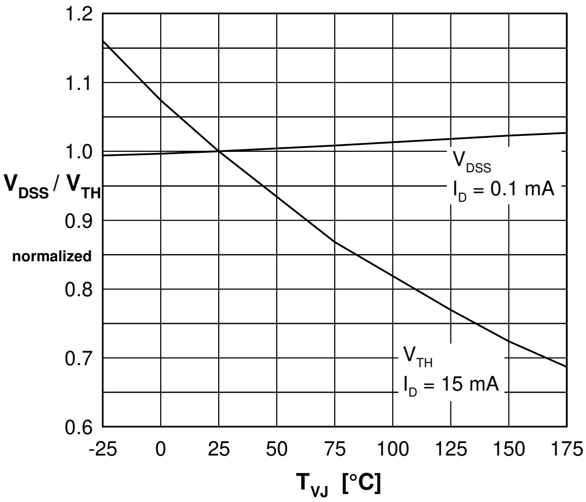


Fig. 7 Norm. breakdown V_{DSS} & threshhold voltage V_{TH} versus junction temperature T_{VJ}

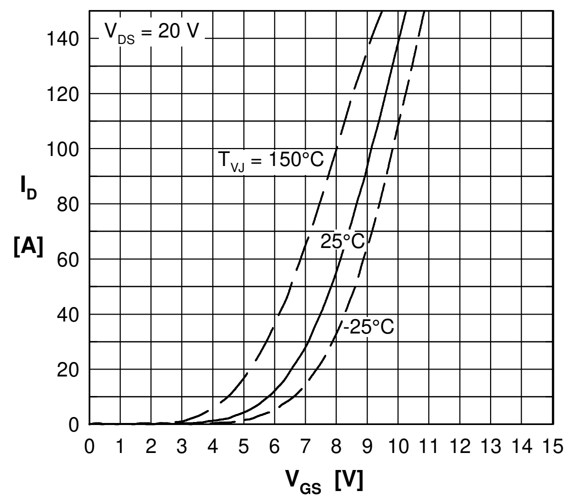


Fig. 8 Typical transfer characteristics

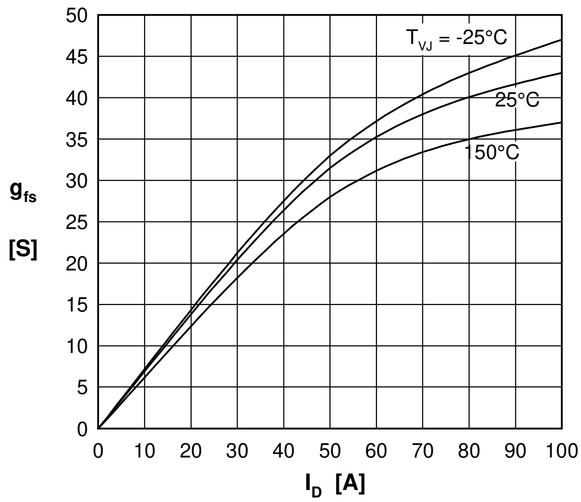


Fig. 9 Typical forward transconductance

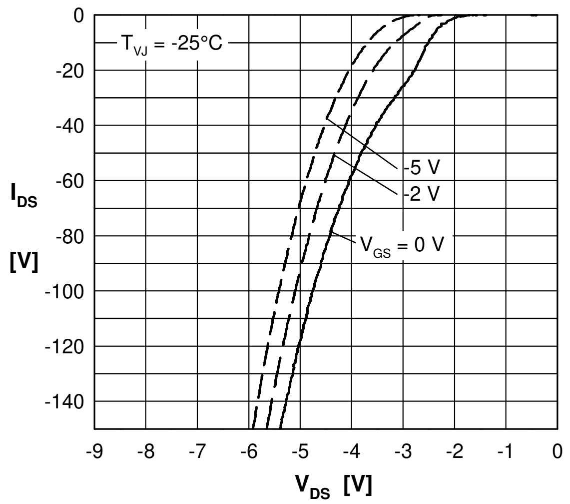


Fig. 10 Forward voltage drop of intrinsic diode versus V_{DS} measured at -25°C

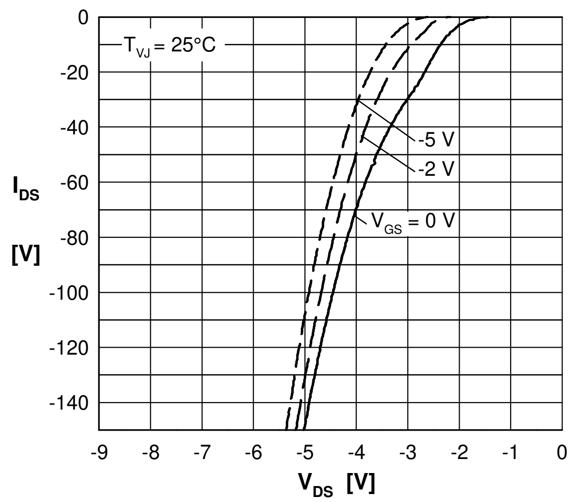


Fig. 11 Forward voltage drop of intrinsic diode versus V_{DS} measured at 25°C

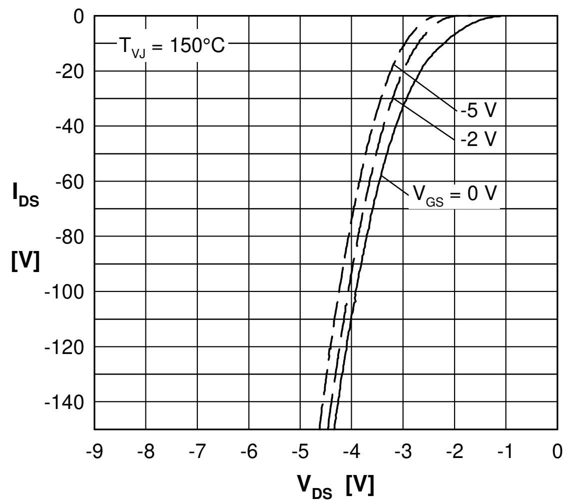


Fig. 12 Forward voltage drop of intrinsic diode versus V_{DS} measured at 150°C

Curves

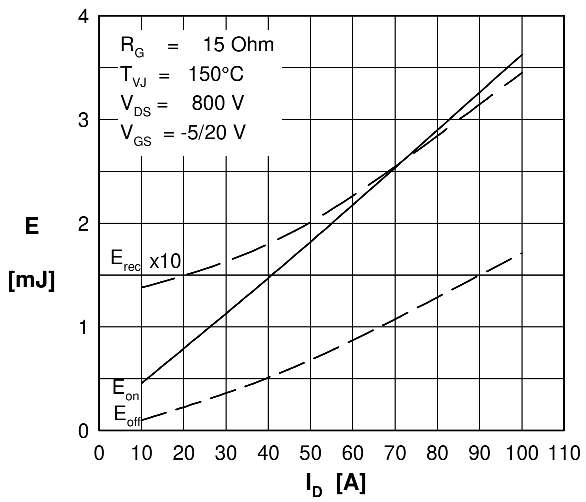


Fig. 13 Typical switching energy versus drain current

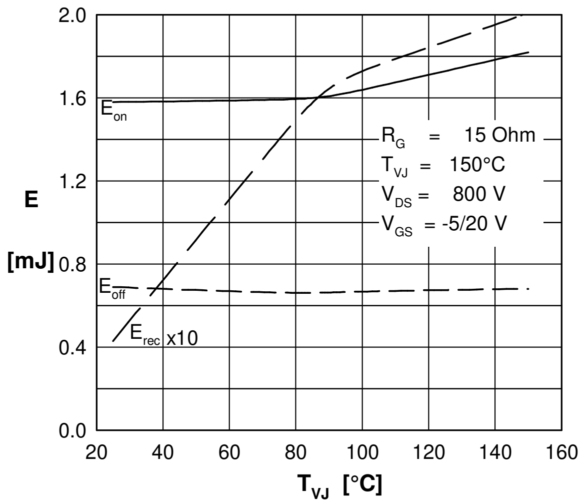


Fig. 14 Typical switching energy versus temperature

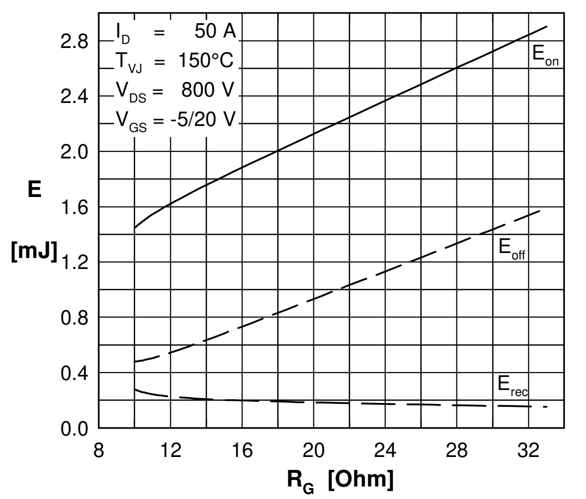


Fig. 15 Typical switching energy versus external gate resistor

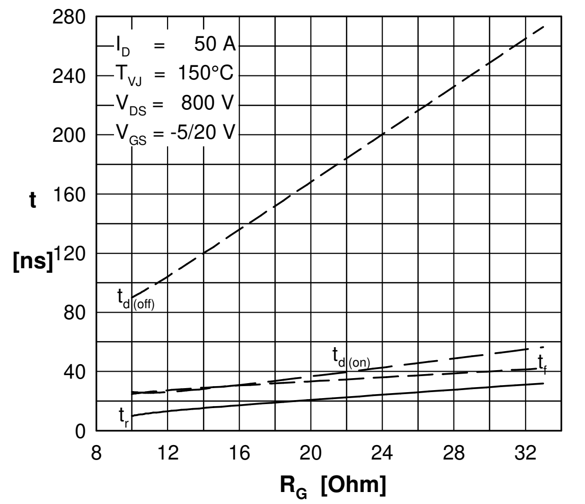


Fig. 16 Typical switching time versus external gate resistor

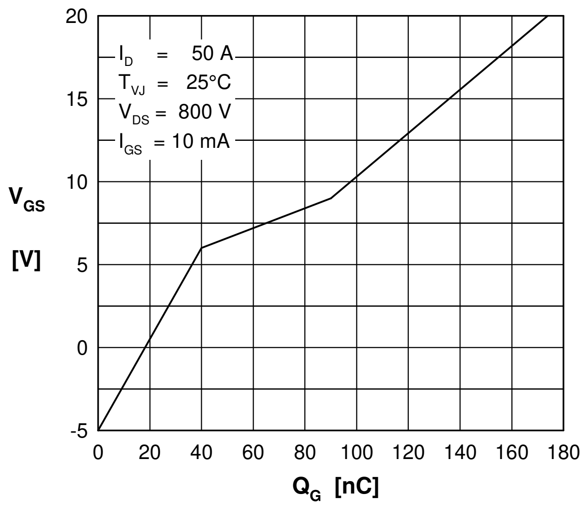


Fig. 17 Typical turn on gate charge, trendline

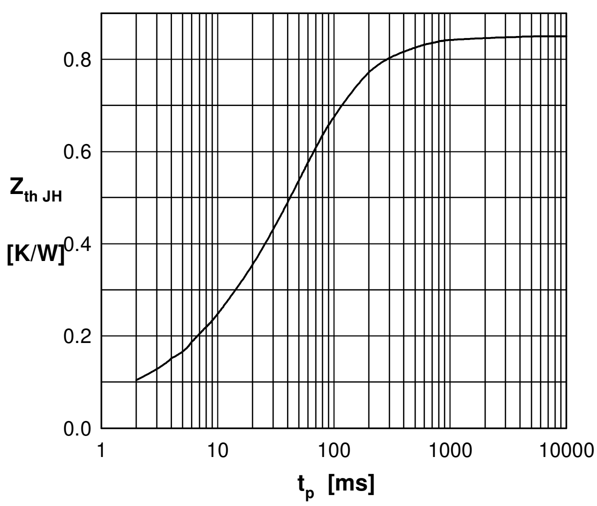


Fig. 18 Typical transient thermal impedance junction to heatsink