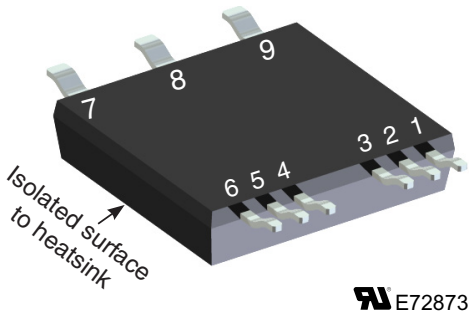
SiC Power MOSFET

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

Part number
MCB40P1200LB



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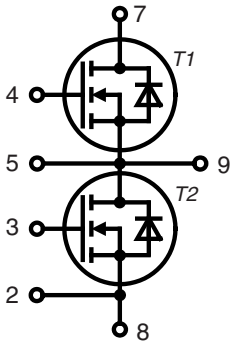


Features / Advantages:
- High speed switching with low capacitances
- High blocking voltage with low $R_{DS(on)}$
- Easy to parallel and simple to drive
- Resistant to latch-up
- Real Kelvin source connection

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

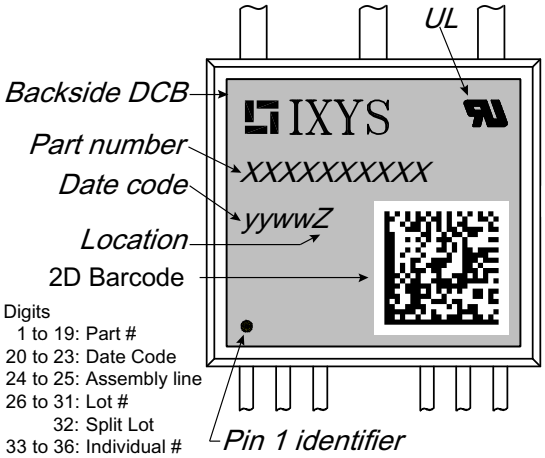
Package: SMPD
- DCB isolated backside
- Isolation Voltage 2500 V
- Epoxy meets UL 94V-0
- RoHS compliant
- Advanced power cycling

MOSFET				Ratings			
Symbol	**Definitions**	**Conditions**		**min.**	**typ.**	**max.**	
$V_{(BR)DSS}$	*drain source breakdown voltage*	I_D = 100 µA		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	T_C = 25°C			55	A
I_{D80}			T_C = 80°C			44	A
I_{D100}			T_C = 100°C			39	A
R_{DSon}	*static drain source on resistance*	I_D = 50 A; V_{GS} = 20 V	T_{VJ} = 25°C		25	34	mΩ
			T_{VJ} = 175°C		52		mΩ
$V_{GS(th)}$	*gate threshold voltage*	I_D = 15 mA; V_{GS} = V_{DS}	T_{VJ} = 25°C	2.0	2.6	4.0	V
			T_{VJ} = 175°C		2.1		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}	*input capacitance*	V_{DS} = 1000 V; V_{GS} = 0 V; f = 1 MHz	T_{VJ} = 25°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	T_{VJ} = 25°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 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		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 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		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	T_{VJ} = 25°C		4.0		V
			T_{VJ} = 175°C		3.5		V
t_{rr}	*reverse recovery time*	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		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; Mosfet gat drive: V_{GS} = -5/20 V; R_G = 15 Ω (external)	T_{VJ} = 150°C		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} 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

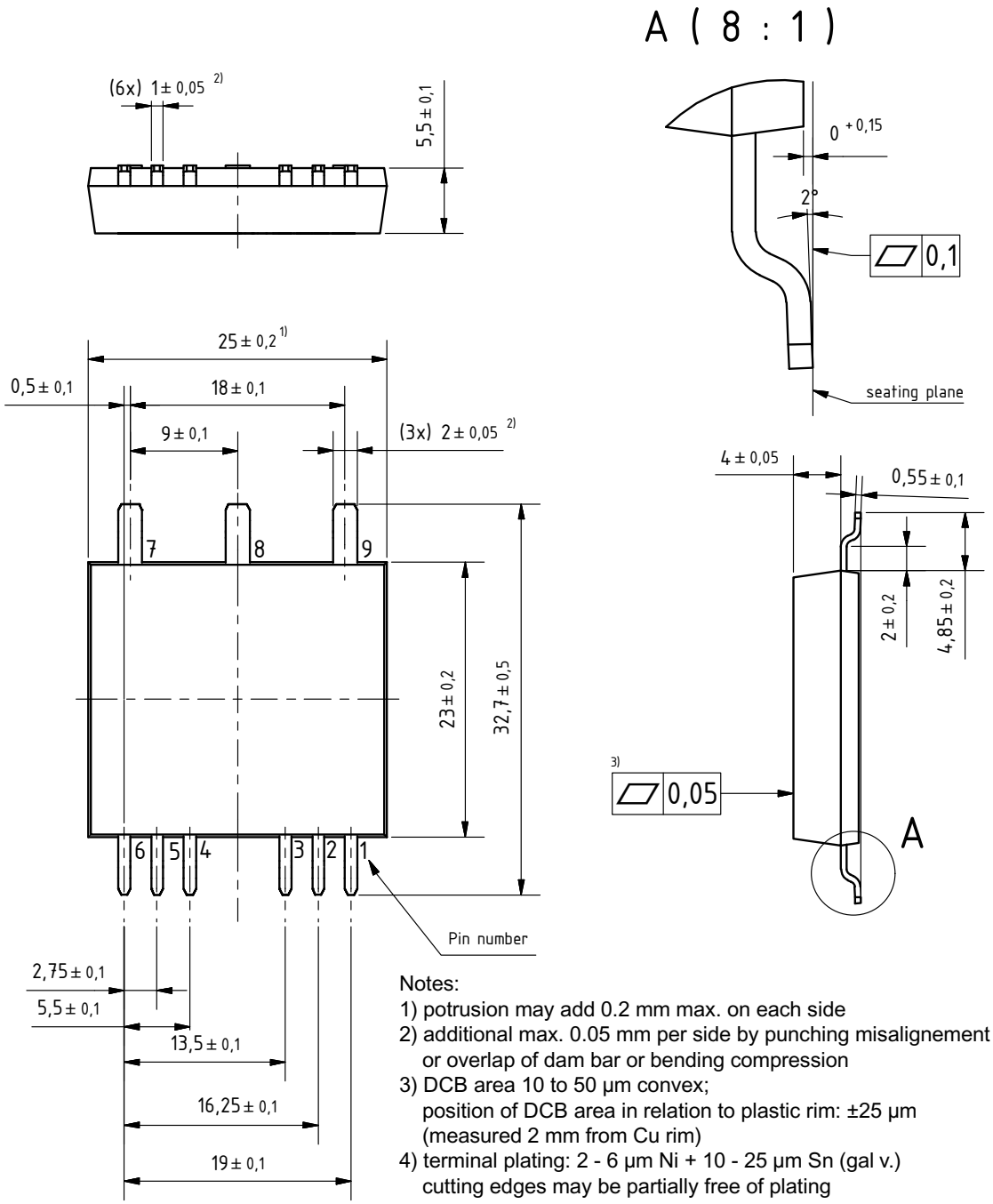


Part number

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

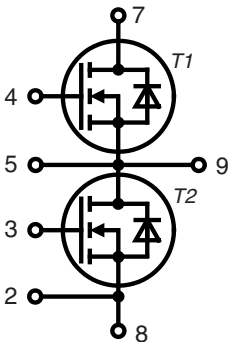
Ordering	Part Name	Marking on Product	Delivering Mode	Base Qty	Ordering Code
Standard	MCB40P1200LB-TUB	MCB40P1200LB	Tube	20	MCB40P1200LB-TUB
Alternativ	MCB40P1200LB-TRR	MCB40P1200LB	Tape&Reel	200	MCB40P1200LB-TRR

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

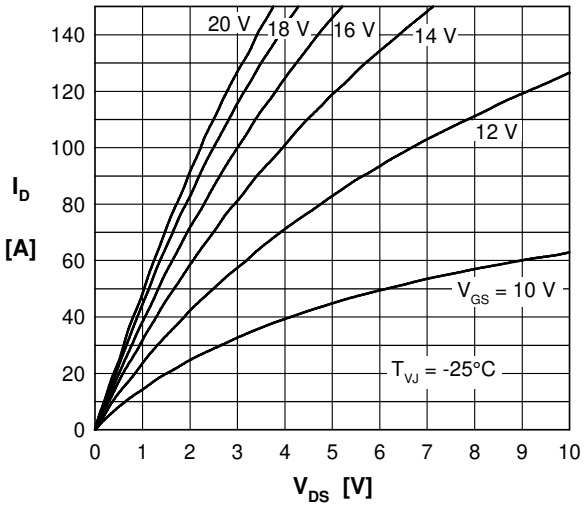


Fig. 1 Typical output characteristics (-25°C)

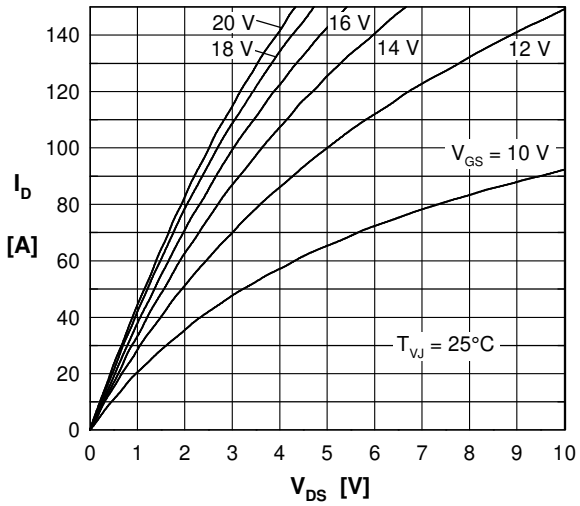


Fig. 2 Typical output characteristics (25°C)

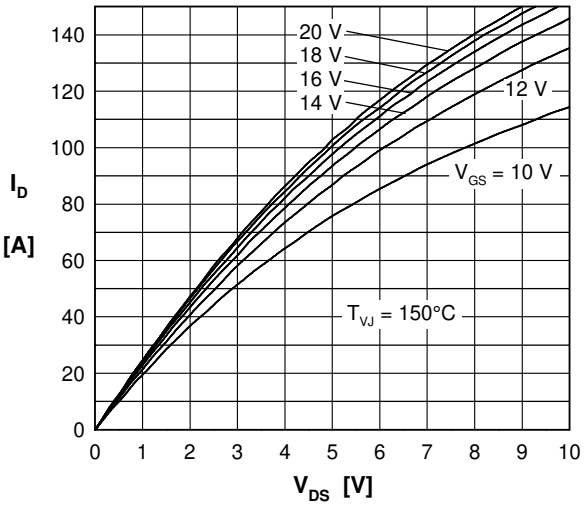


Fig. 3 Typical output characteristics (150°C)

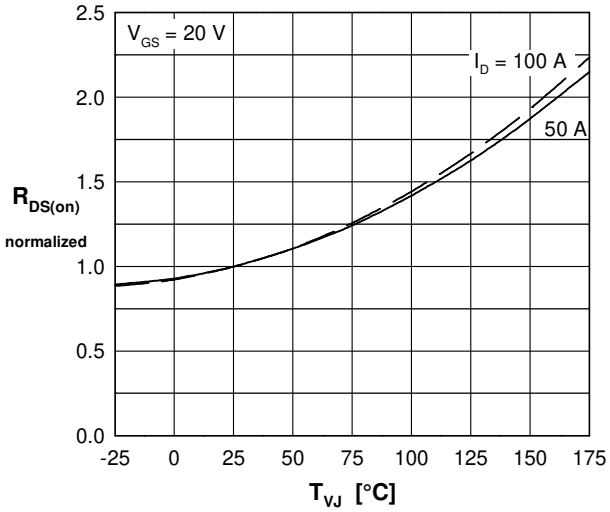


Fig. 4 $R_{DS(on)}$ normalized vs. junction temperature T_{VJ}

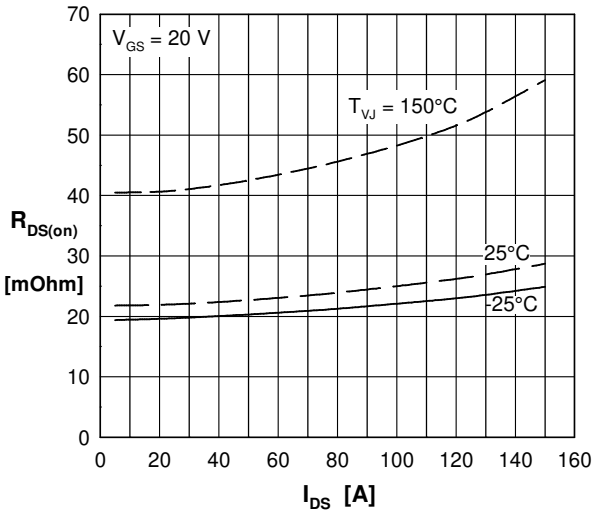


Fig. 5 $R_{DS(on)}$ versus drain current

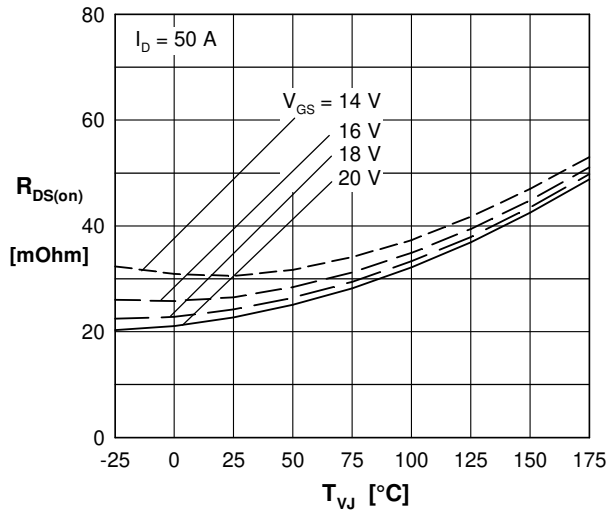


Fig. 6 $R_{DS(on)}$ versus junction temperature T_{VJ}

Curves

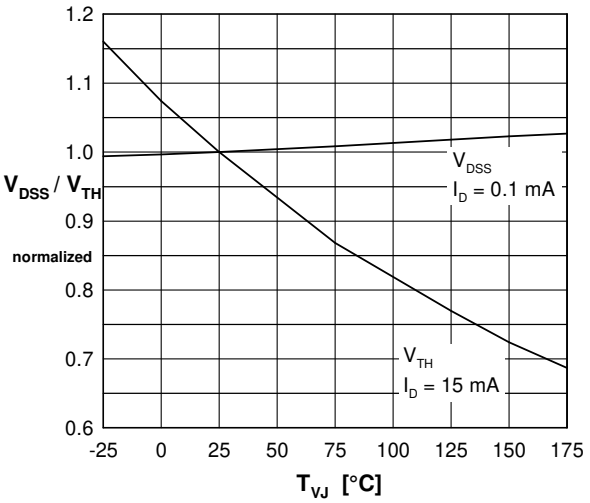


Fig. 7 Norm. breakdown V_{DSS} & threshhold voltage V_{TH} versus junction temperature T_{VJ}

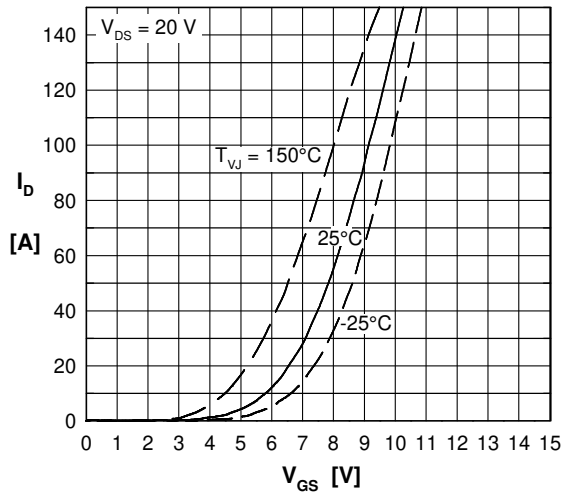


Fig. 8 Typical transfer characteristics

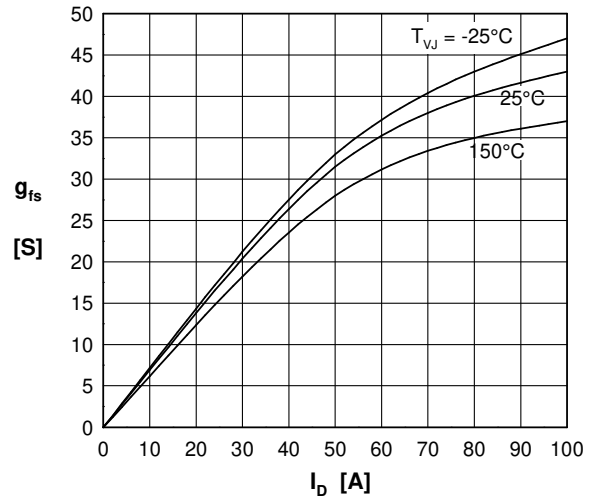


Fig. 9 Typical forward transconductance

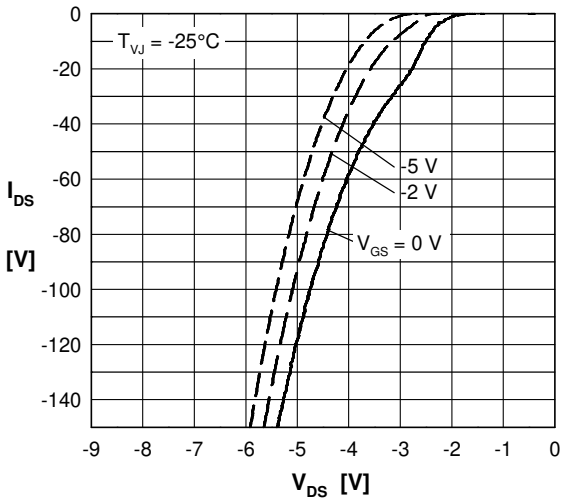


Fig. 10 Forward voltage drop of intrinsic diode versus V_{DS} measured at -25°C

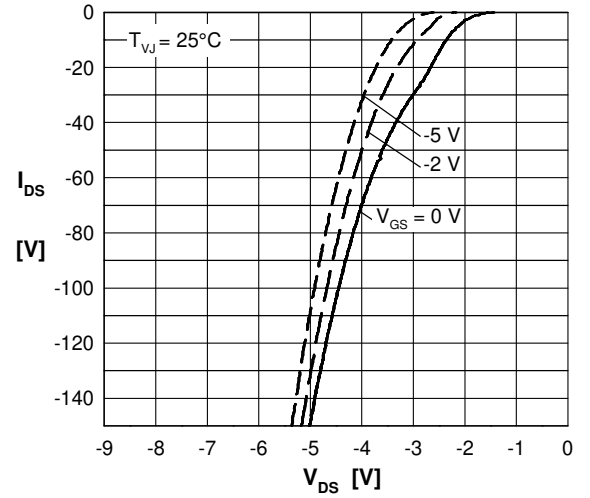


Fig. 11 Forward voltage drop of intrinsic diode versus V_{DS} measured at 25°C

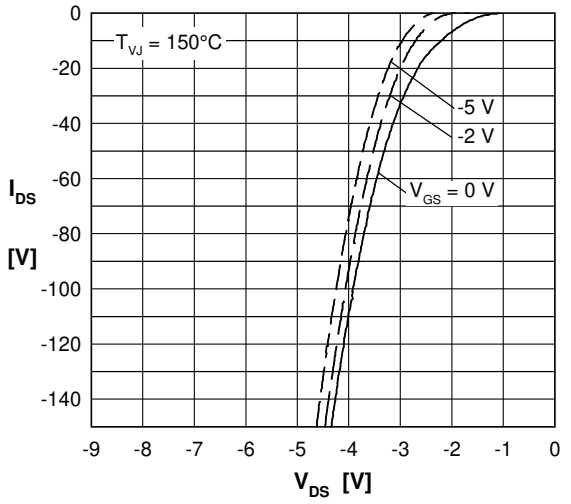


Fig. 12 Forward voltage drop of intrinsic diode versus V_{DS} measured at 150°C

Curves

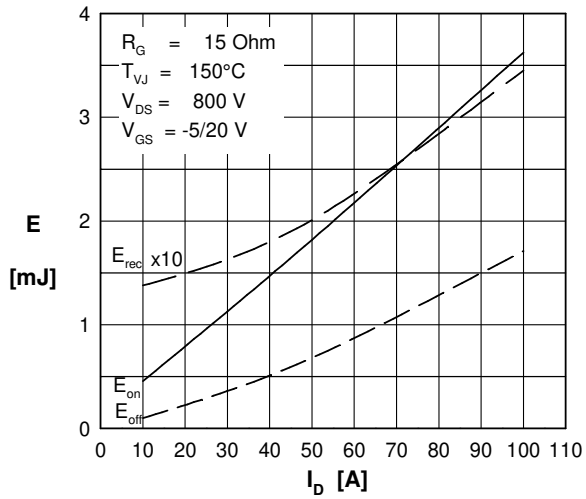


Fig. 13 Typical switching energy versus drain current

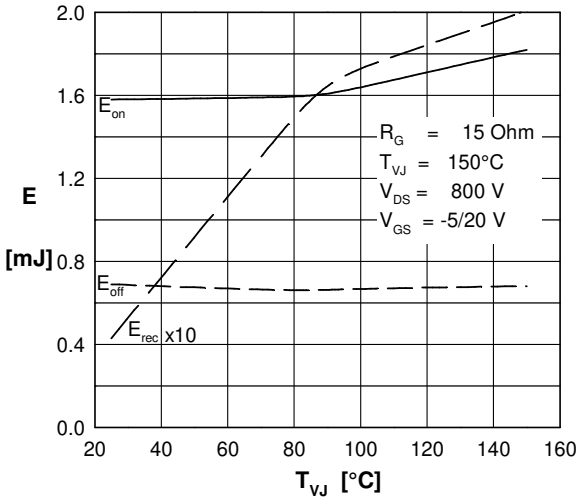


Fig. 14 Typical switching energy versus temperature

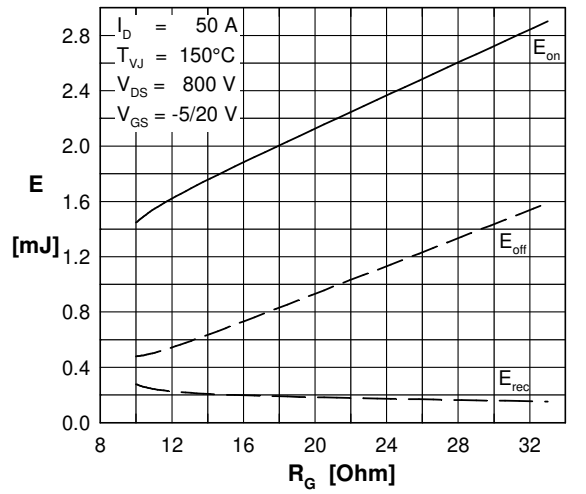


Fig. 15 Typical switching energy versus external gate resistor

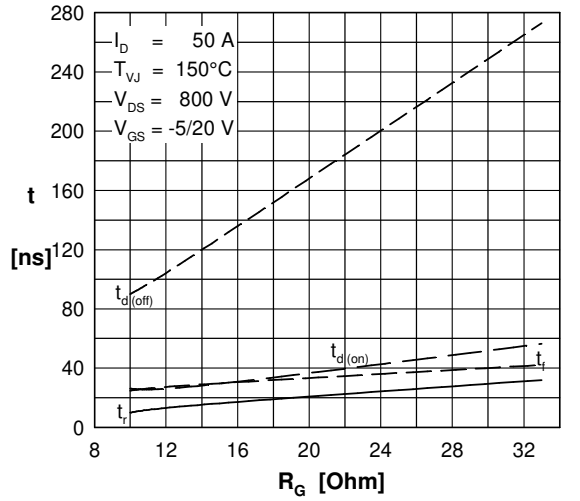


Fig. 16 Typical switching time versus external gate resistor

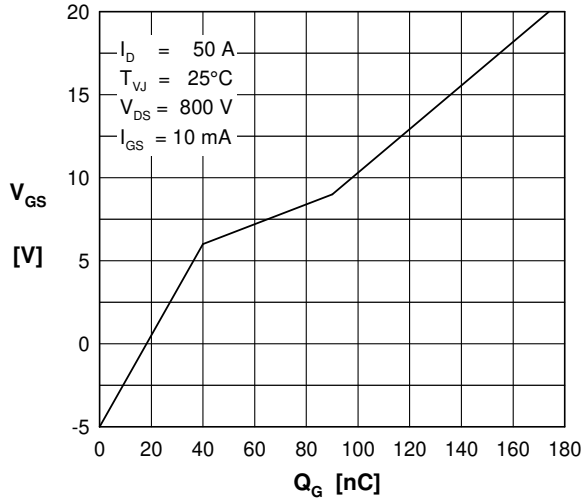


Fig. 17 Typical turn on gate charge, trendline

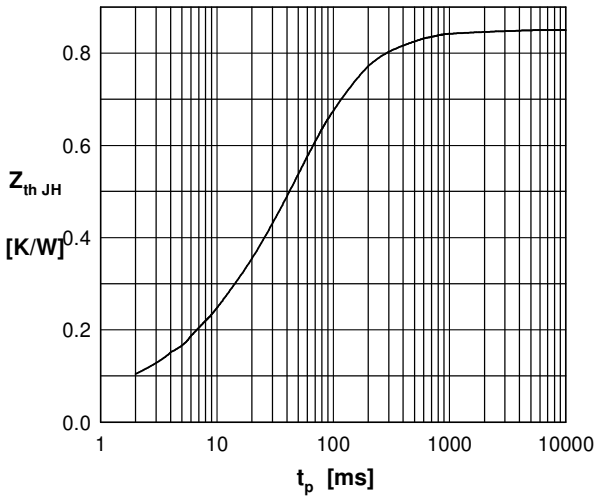


Fig. 18 Typical transient thermal impedance junction to heatsink