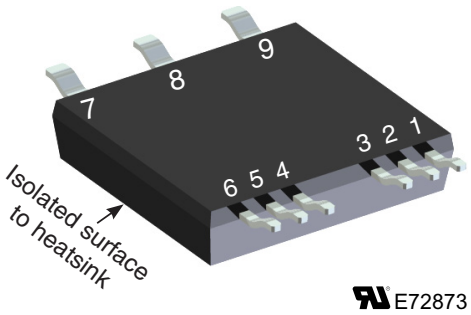
SiC Power MOSFET

I_{D25} = 25.5 A
V_{DSS} = 1200 V
$R_{DS(on)\ max}$ = 98 mΩ

Part number
MCB20P1200LB



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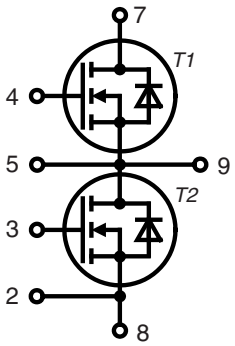


Features / Advantages:
- High speed switching with low capacitances
- High blocking voltage with low $R_{DS(on)}$
- Easy to parallel and simple to drive
- Resistant to latch-up
- Real Kelvin source connection

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

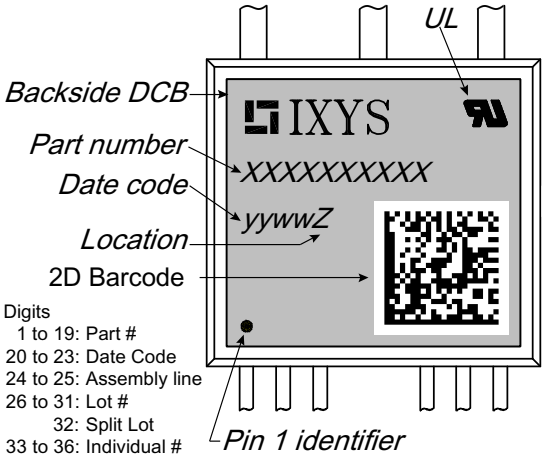
Package: SMPD
- DCB isolated backside
- Isolation Voltage 2500 V
- Epoxy meets UL 94V-0
- RoHS compliant
- Advanced power cycling

MOSFET				Ratings			
Symbol	**Definitions**	**Conditions**		**min.**	**typ.**	**max.**	
V_{DSS}	*drain source breakdown voltage*	V_{GS} = 0 V, I_D = 100 µA		1200			V
V_{GSM}	*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			25.5	A
I_{D80}			T_C = 80°C			20.5	A
I_{D100}			T_C = 100°C			18	A
R_{DSon}	*static drain source on resistance*	I_D = 50 A; V_{GS} = 20 V	T_{VJ} = 25°C		80	98	mΩ
			T_{VJ} = 175°C		155		mΩ
$V_{GS(th)}$	*gate threshold voltage*	I_D = 5 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			250	nA
R_G	*internal gate resistance*	f = 1 MHz, V_{AC} = 25 mV, ESR of C_{ISS}			4.6		Ω
C_{iss}	*input capacitance*	V_{DS} = 1000 V; V_{GS} = 0 V; f = 1 MHz	T_{VJ} = 25°C		950		pF
C_{oss}	*output capacitance*				80		pF
C_{rss}	*reverse transfer (Miller) capacitance*				7.6		pF
Q_g	*total gate charge*	V_{DS} = 800 V; I_D = 40 A; V_{GS} = -5/20 V	T_{VJ} = 25°C		62		nC
Q_{gs}	*gate source charge*				23		nC
Q_{gd}	*gate drain (Miller) charge*				37		nC
$t_{d(on)}$	*turn-on delay time*	Inductive switching V_{DS} = 800 V; I_D = 20 A V_{GS} = -5 / 20 V; R_G = 22 Ω (external) Freewheeling diode is Mosfet's body diode	T_{VJ} = 25°C		19		ns
t_r	*current rise time*				7		ns
$t_{d(off)}$	*turn-off delay time*				66		ns
t_f	*current fall time*				23		ns
E_{on}	*turn-on energy per pulse*				0.41		mJ
E_{off}	*turn-off energy per pulse*				0.21		mJ
$E_{rec(off)}$	*reverse recovery losses at turn-off*				0.07		mJ
$t_{d(on)}$	*turn-on delay time*	Inductive switching V_{DS} = 800 V; I_D = 20 A V_{GS} = -5 / 20 V; R_G = 22 Ω (external) Freewheeling diode is Mosfet's body diode	T_{VJ} = 150°C		18		ns
t_r	*current rise time*				7		ns
$t_{d(off)}$	*turn-off delay time*				75		ns
t_f	*current fall time*				21		ns
E_{on}	*turn-on energy per pulse*				0.49		mJ
E_{off}	*turn-off energy per pulse*				0.20		mJ
$E_{rec(off)}$	*reverse recovery losses at turn-off*				0.10		mJ
R_{thJC}	*thermal resistance junction to case*					1.0	K/W
R_{thJH}	*thermal resistance junction to heatsink*	with heatsink compound; IXYS test setup			1.5		K/W

Source-Drain Diode				Ratings			
Symbol	**Definitions**	**Conditions**		**min.**	**typ.**	**max.**	
V_{SD}	*forward voltage drop*	I_F = 10 A; V_{GS} = -5 V	T_{VJ} = 25°C		3.3		V
			T_{VJ} = 150°C		3.1		V
t_{rr}	*reverse recovery time*	V_{GS} = -5 V; I_F = 20 A; V_R = 800 V Mosfet gate drive: V_{GS} = -5 / 20 V; R_G = 22 Ω	T_{VJ} = 25°C		15		ns
Q_{RM}	*reverse recovery charge (intrinsic diode)*				0.20		µC
I_{RM}	*max. reverse recovery current*				23		A
dI_F/dt	*current slew rate*				3650		A/µs
t_{rr}	*reverse recovery time*	V_{GS} = -5 V; I_F = 20 A; V_R = 800 V Mosfet gate drive: V_{GS} = -5 / 20 V; R_G = 22 Ω	T_{VJ} = 150°C		19		ns
Q_{RM}	*reverse recovery charge (intrinsic diode)*				0.42		µC
I_{RM}	*max. reverse recovery current*				35		A
dI_F/dt	*current slew rate*				4120		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

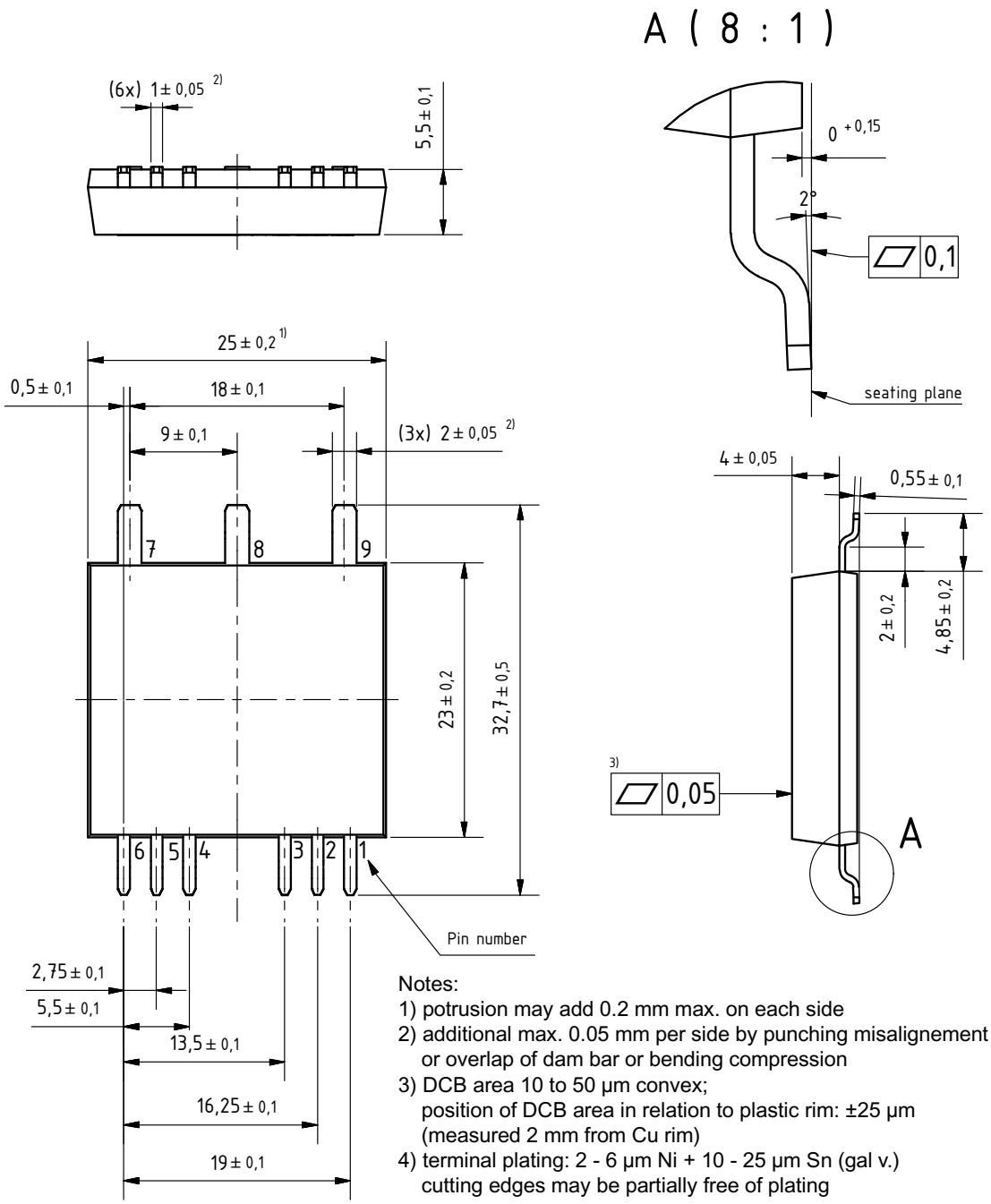


Part number

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

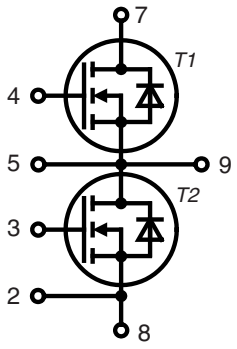
Ordering	Part Name	Marking on Product	Delivering Mode	Base Qty	Ordering Code
Standard	MCB20P1200LB-TUB	MCB20P1200LB	Tube	20	MCB20P1200LB-TUB
Alternative	MCB20P1200LB-TRR	MCB20P1200LB	Tape&Reel	200	MCB20P1200LB-TRR

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

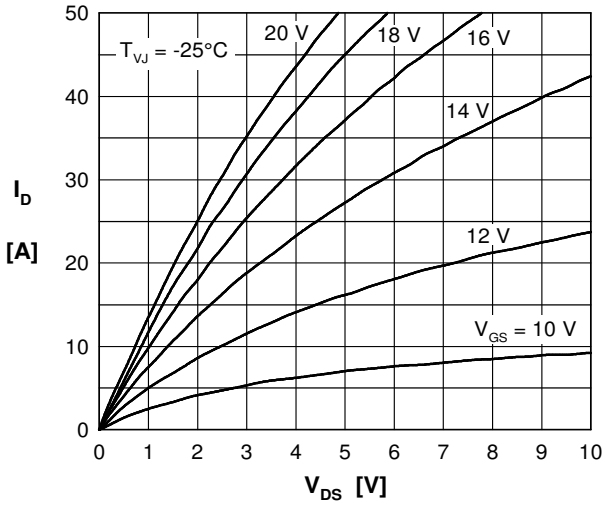


Fig. 1 Typical output characteristics (-25°C)

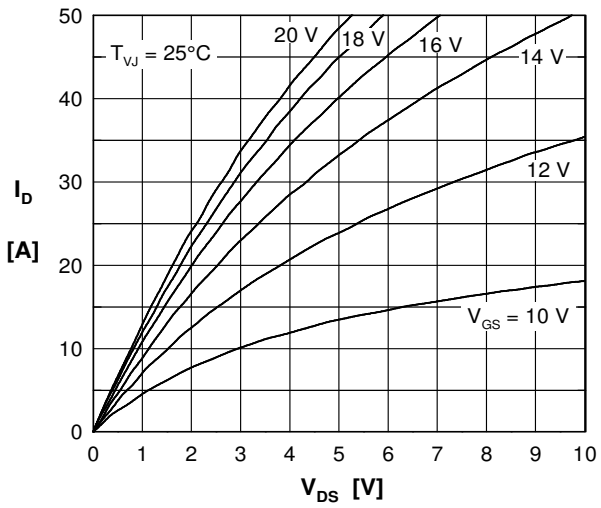


Fig. 2 Typical output characteristics (25°C)

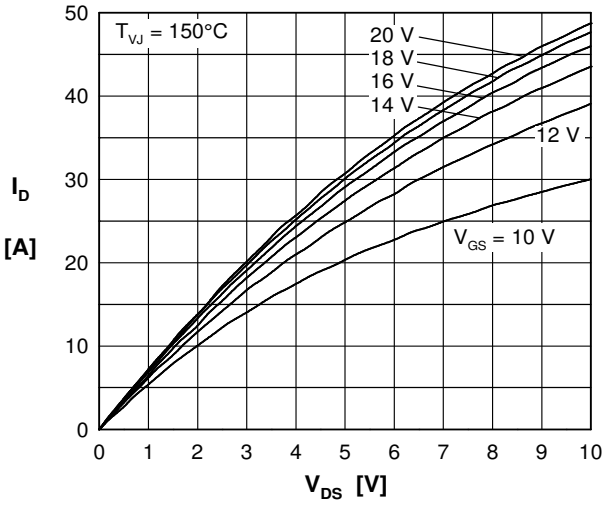


Fig. 3 Typical output characteristics (150°C)

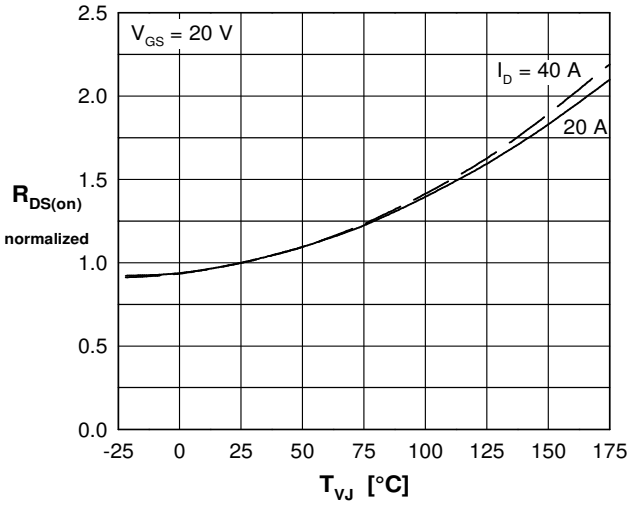


Fig. 4 $R_{DS(on)}$ normalized vs. junction temperature T_{VJ}

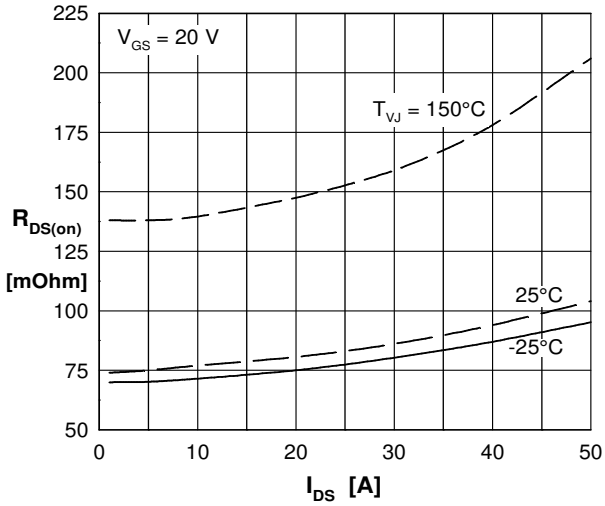


Fig. 5 $R_{DS(on)}$ versus drain current

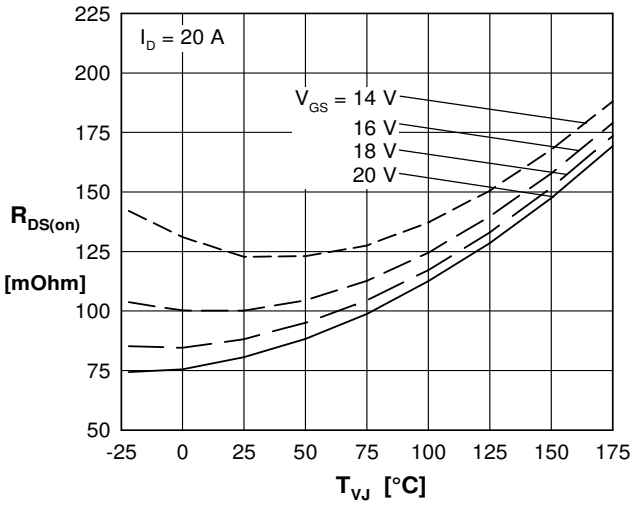


Fig. 6 $R_{DS(on)}$ versus junction temperature T_{VJ}

Curves

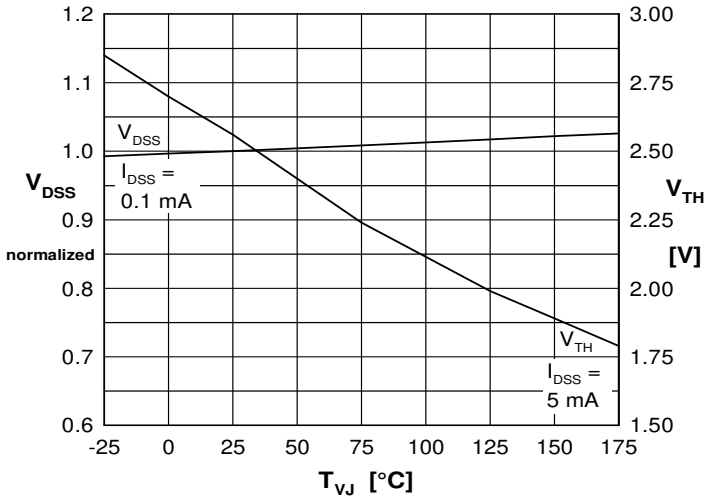


Fig. 7 Norm. breakdow V_{DSS} & treshhold voltage V_{TH} versus junction temperature T_{VJ}

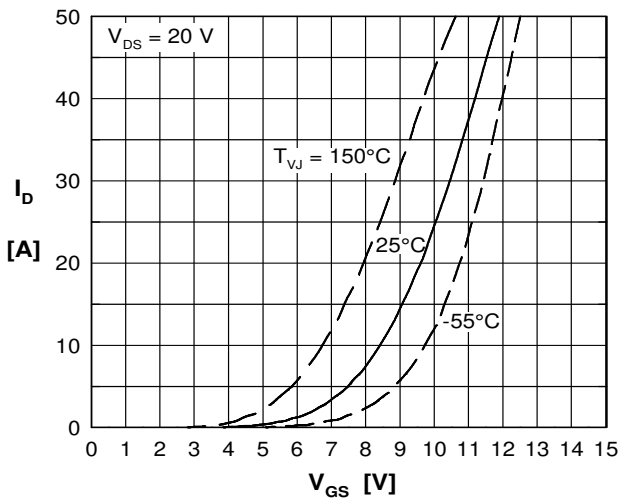


Fig. 8 Typical transfer characteristics

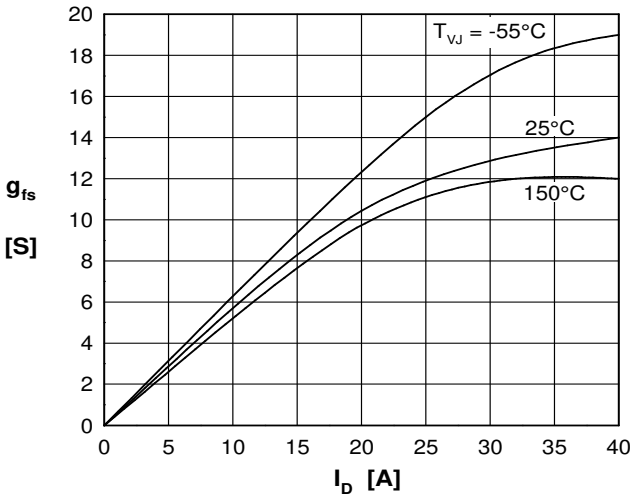


Fig. 9 Typical forward transconductance

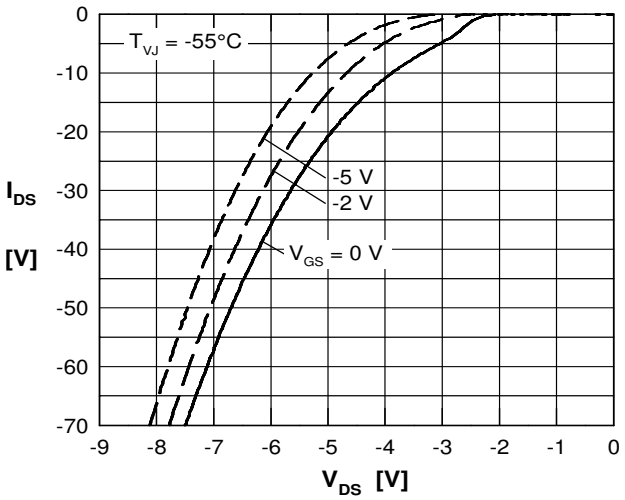


Fig. 10 Forward voltage drop of intrinsic diode versus V_{DS} measured at -55°C

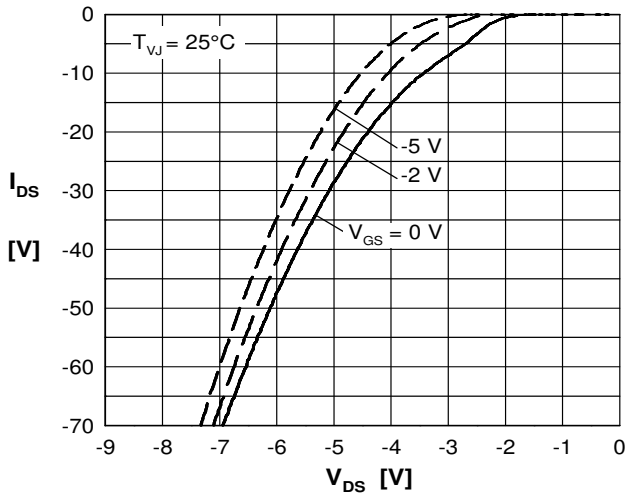


Fig. 11 Forward voltage drop of intrinsic diode versus V_{DS} measured at 25°C

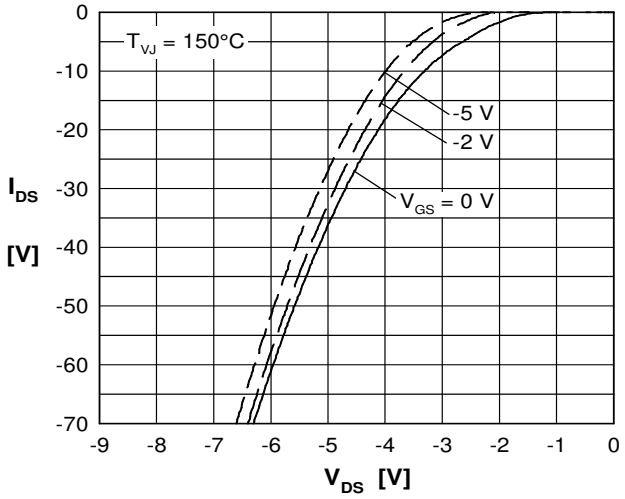


Fig. 12 Forward voltage drop of intrinsic diode versus V_{DS} measured at 150°C

Curves

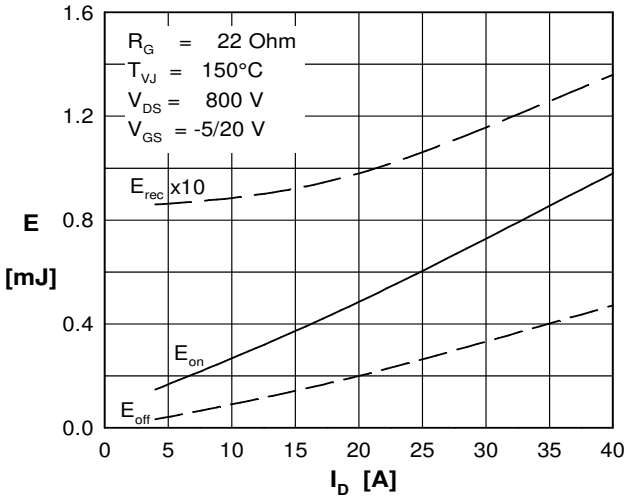


Fig. 13 Typical switching energy versus drain current

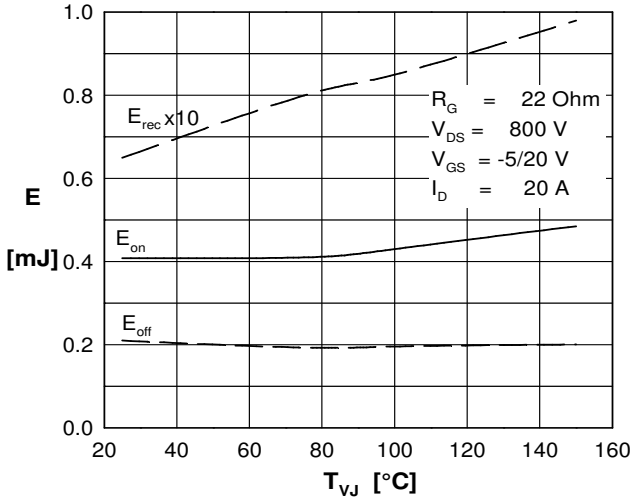


Fig. 14 Typical switching energy versus temperature

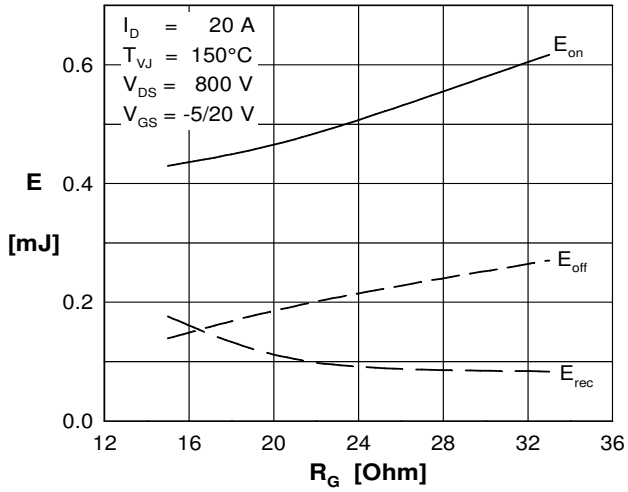


Fig. 15 Typical switching energy versus external gate resistor

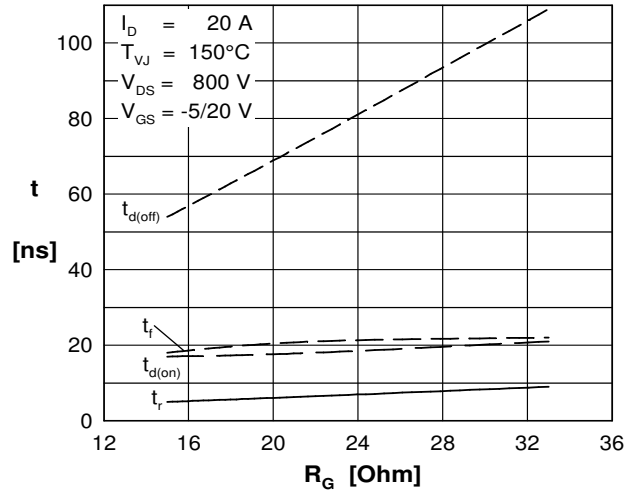


Fig. 16 Typical switching time versus external gate resistor

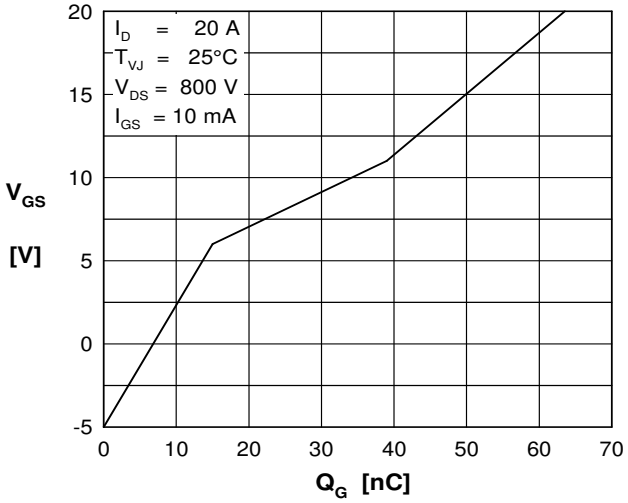


Fig. 17 Typical turn on gate charge, trendline

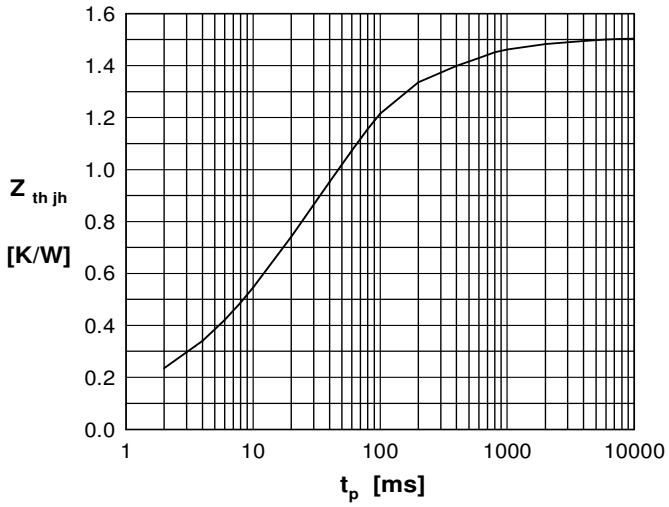


Fig. 18 Typical transient thermal impedance