

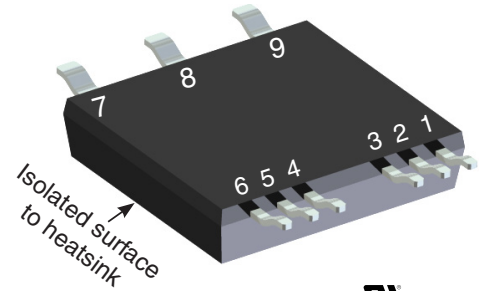
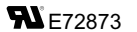
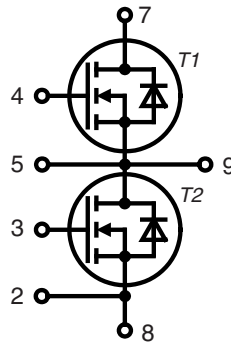
# SiC Power MOSFET

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

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

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

**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

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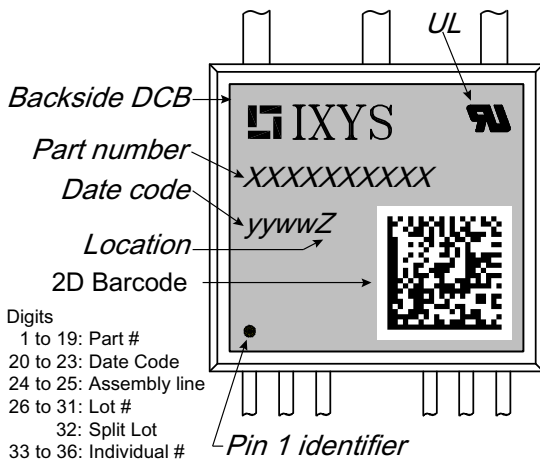
MOSFET				Ratings			
Symbol	Definitions	Conditions	min.	typ.	max.		
$V_{(BR)DSS}$	drain source breakdown voltage	$I_D = 100 \mu A$	1200			V	
$V_{GS(max)}$	max transient gate source voltage		-10		+25	V	
$V_{GS}$	continous gate source voltage	recommended operational value	-5		+20	V	
$I_{D25}$ $I_{D80}$ $I_{D100}$	drain current	$V_{GS} = 20 V$ $T_C = 25^\circ C$ $T_C = 80^\circ C$ $T_C = 100^\circ C$			55 44 39	A A A	
$R_{DSon}$	static drain source on resistance		$I_D = 50 A; V_{GS} = 20 V$ $T_{VJ} = 25^\circ C$ $T_{VJ} = 175^\circ C$		25 52	34	mΩ mΩ
$V_{GS(th)}$	gate threshold voltage			$I_D = 15 mA; V_{GS} = V_{DS}$ $T_{VJ} = 25^\circ C$ $T_{VJ} = 175^\circ C$	2.0	2.6 2.1	4.0
$I_{DSS}$	drain source leakage current	$V_{DS} = 1200 V; V_{GS} = 0 V$		2	100	$\mu A$	
$I_{GSS}$	gate source leakage current	$V_{DS} = 0 V; V_{GS} = 20 V$			0.6	$\mu A$	
$R_G$	internal gate resistance	$f = 1 MHz, V_{AC} = 25 mV, ESR \text{ of } C_{ISS}$		1.1		Ω	
$C_{ISS}$ $C_{OSS}$ $C_{RSS}$	input capacitance output capacitance reverse transfer (Miller) capacitance	$V_{DS} = 1000 V; V_{GS} = 0 V; f = 1 MHz$ $T_{VJ} = 25^\circ C$		2790 220 15		pF pF pF	
$Q_g$ $Q_{GS}$ $Q_{gd}$	total gate charge gate source charge gate drain (Miller) charge		$V_{DS} = 800 V; I_D = 50 A; V_{GS} = -5/20 V$ $T_{VJ} = 25^\circ C$		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 @ $V_{GS} = -5V$ $V_{DS} = 800 V; I_D = 50 A$ $V_{GS} = -5/20 V; R_G = 15 \Omega$ (external) $T_{VJ} = 25^\circ C$		33 20 116 27 1.58 0.69	
$t_{d(on)}$ $t_r$ $t_{d(off)}$ $t_f$ $E_{on}$ $E_{off}$	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 @ $V_{GS} = -5V$ $V_{DS} = 800 V; I_D = 50 A$ $V_{GS} = -5/20 V; R_G = 15 \Omega$ (external) $T_{VJ} = 150^\circ C$				30 16 128 30 1.82 0.68	
$R_{thJC}$ $R_{thJH}$	thermal resistance junction to case thermal resistance junction to heatsink		with heatsink compound; IXYS test setup				0.70 0.85

Source-Drain Diode				Ratings		
Symbol	Definitions	Conditions	min.	typ.	max.	
$V_{SD}$	forward voltage drop	$I_F = 25 A; V_{GS} = -5 V$ $T_{VJ} = 25^\circ C$ $T_{VJ} = 175^\circ C$		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: $V_{GS} = -5/20 V; R_G = 15 \Omega$ (external) $T_{VJ} = 25^\circ C$		18 0.34 32 2900	
$t_{rr}$ $Q_{RM}$ $I_{RM}$ $dI_F/dt$	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: $V_{GS} = -5/20 V; R_G = 15 \Omega$ (external) $T_{VJ} = 150^\circ C$			29 0.96 50 3400	

**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
<b>Weight</b>				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

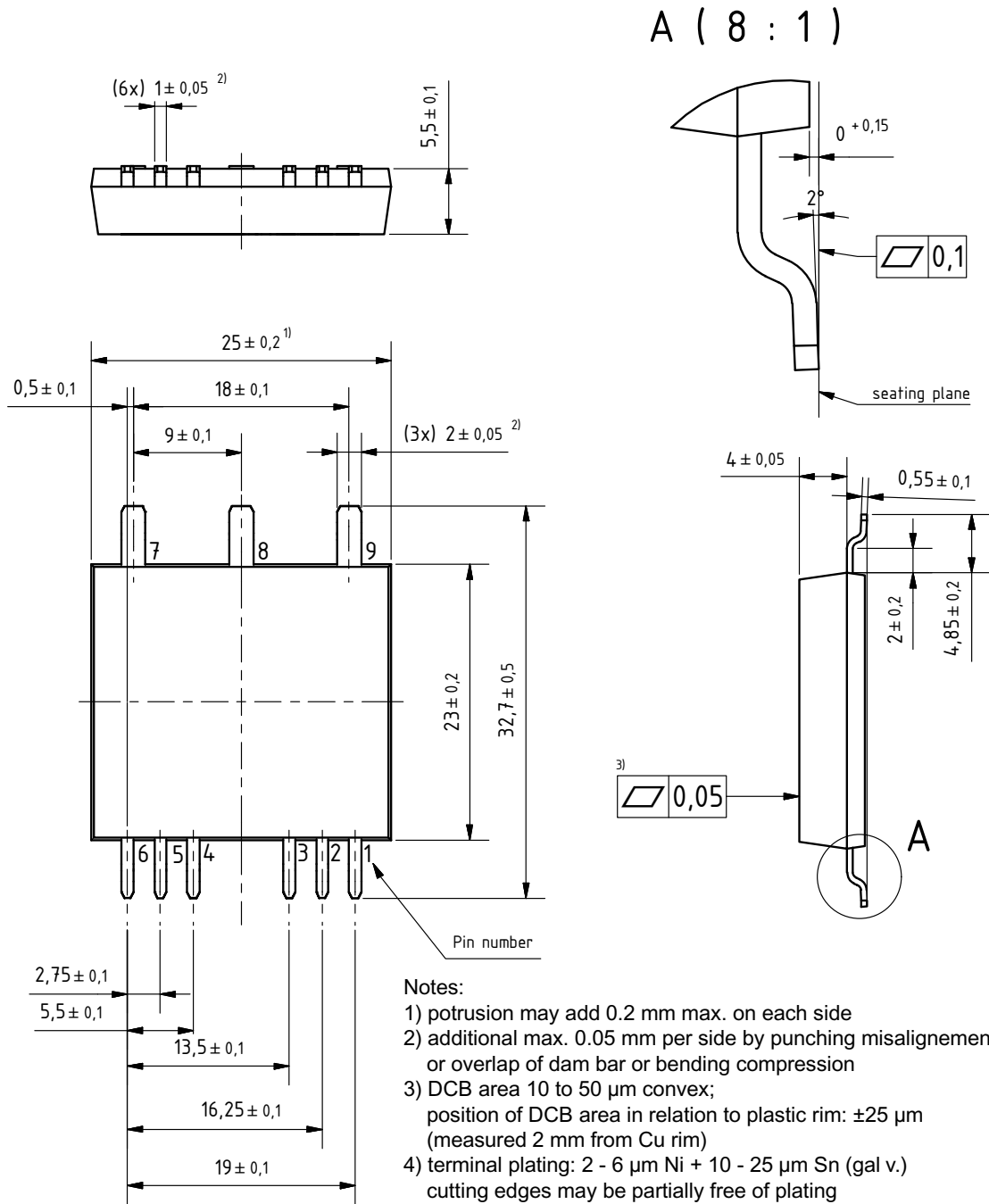
33 to 36: Individual #

**Part number**

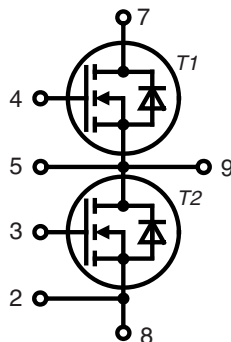
M = Mosfet  
 C = SiC MOSFET  
 B = Generation 2  
 40 = Current Rating [A]  
 P = Phase leg  
 1200 = Reverse Voltage [V]  
 LB = SMPD-B

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



Dimensions in mm  
(1 mm = 0.0394")



**Curves**

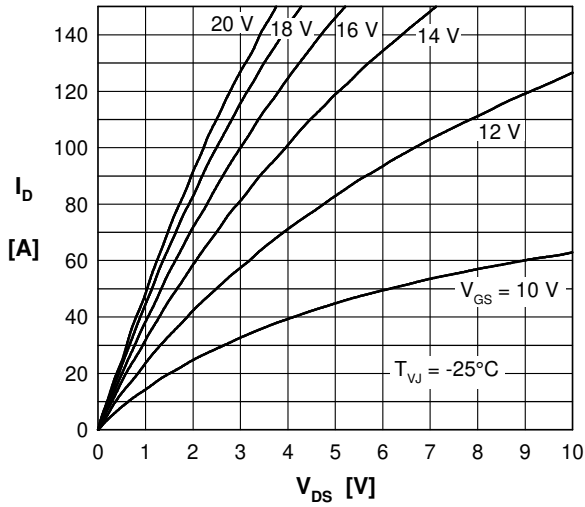


Fig. 1 Typical output characteristics ( $-25^{\circ}\text{C}$ )

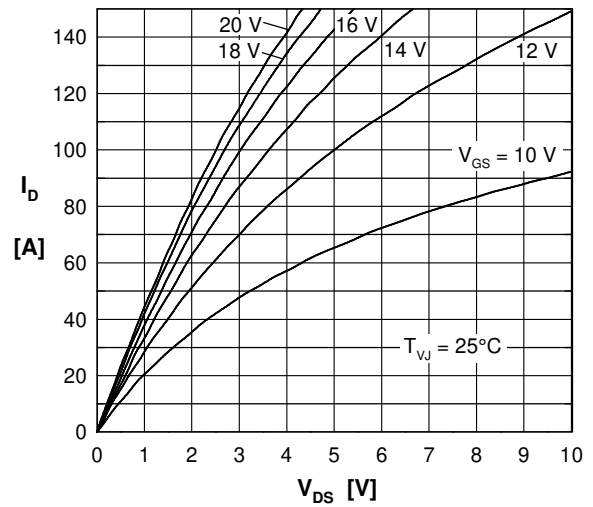


Fig. 2 Typical output characteristics ( $25^{\circ}\text{C}$ )

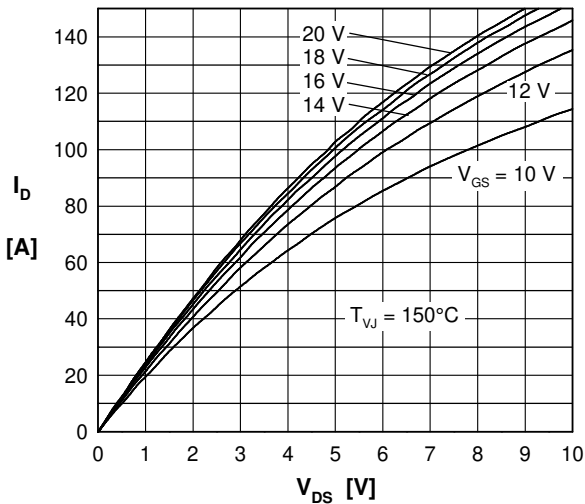


Fig. 3 Typical output characteristics ( $150^{\circ}\text{C}$ )

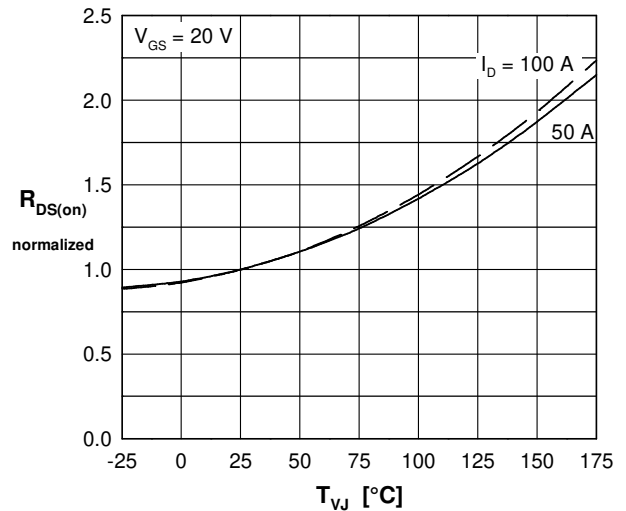


Fig. 4  $R_{DS(on)}$  normalized vs. junction temperature  $T_{VJ}$

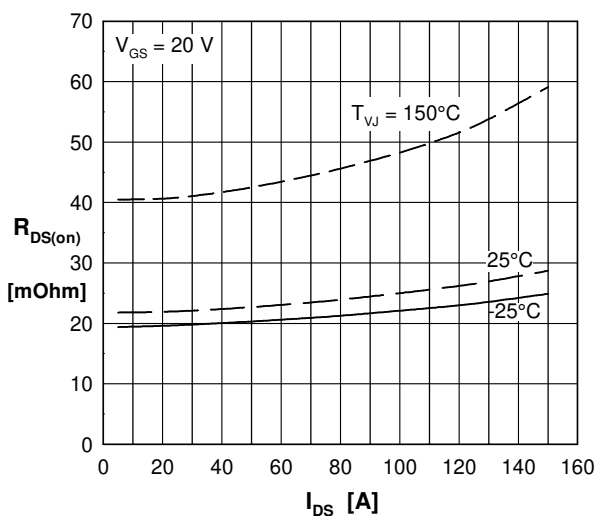


Fig. 5  $R_{DS(on)}$  versus drain current

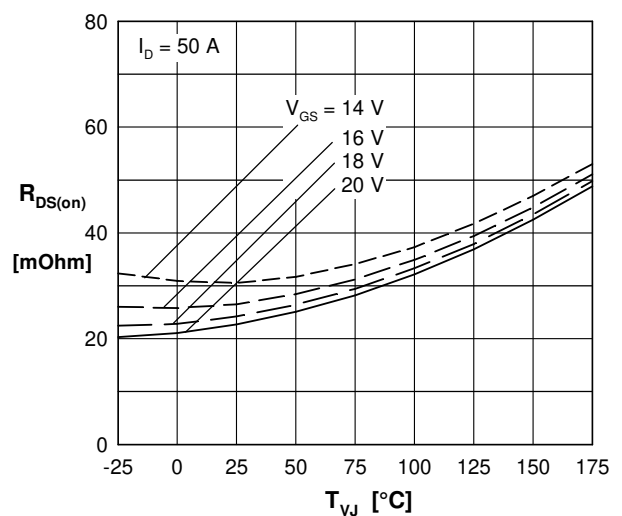


Fig. 6  $R_{DS(on)}$  versus junction temperature  $T_{VJ}$

**Curves**

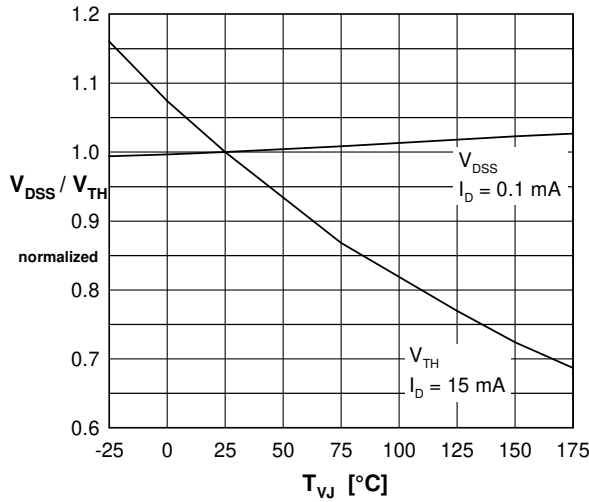


Fig. 7 Norm. breakdown  $V_{DSS}$  & threshold voltage  $V_{TH}$  versus junction temperature  $T_{VJ}$

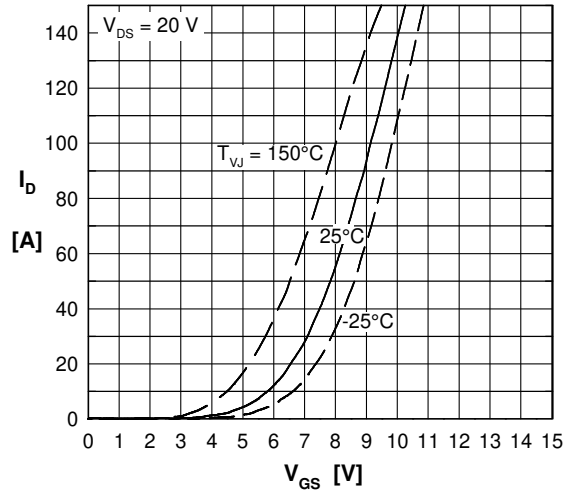


Fig. 8 Typical transfer characteristics

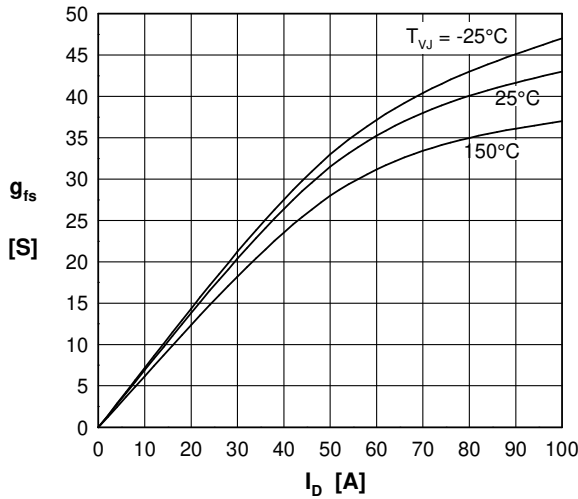


Fig. 9 Typical forward transconductance

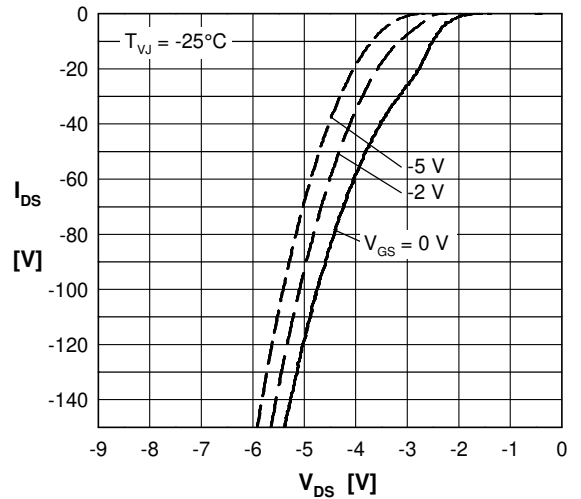


Fig. 10 Forward voltage drop of intrinsic diode versus  $V_{DS}$  measured at  $-25^{\circ}\text{C}$

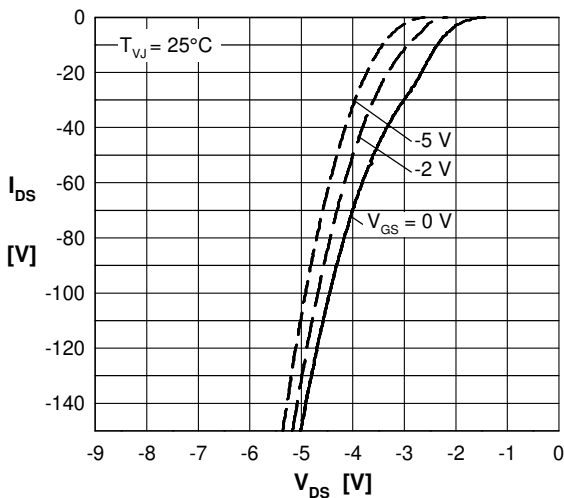


Fig. 11 Forward voltage drop of intrinsic diode versus  $V_{DS}$  measured at  $25^{\circ}\text{C}$

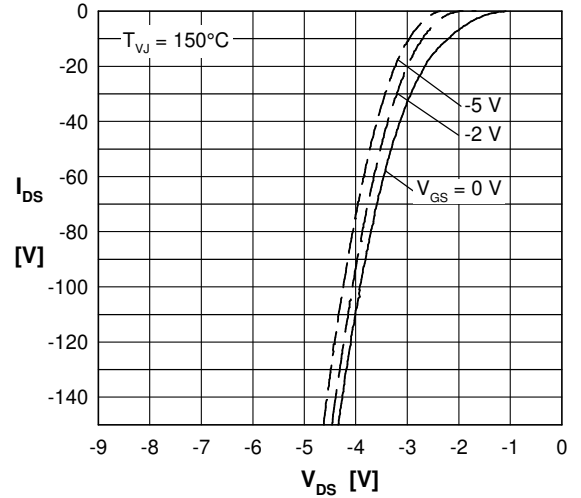


Fig. 12 Forward voltage drop of intrinsic diode versus  $V_{DS}$  measured at  $150^{\circ}\text{C}$

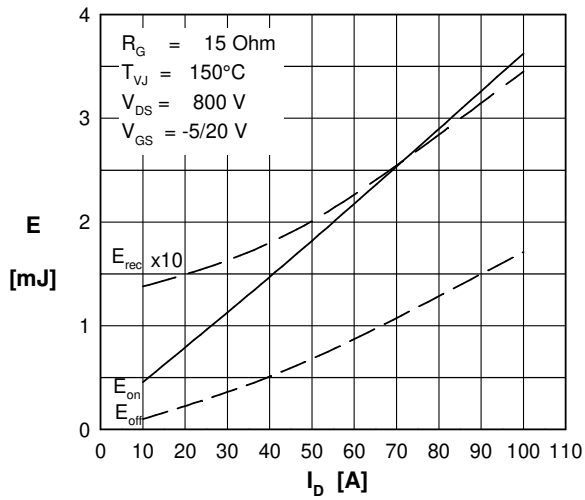
**Curves**


Fig. 13 Typical switching energy versus drain current

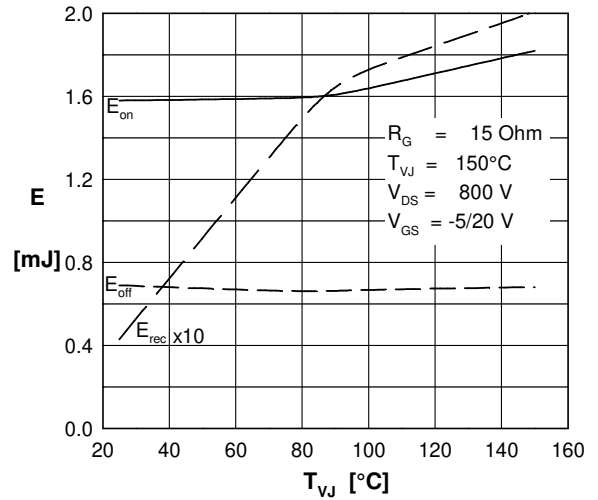


Fig. 14 Typical switching energy versus temperature

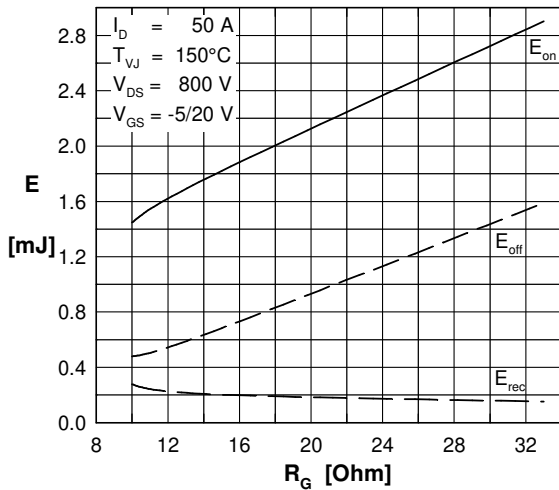


Fig. 15 Typical switching energy versus external gate resistor

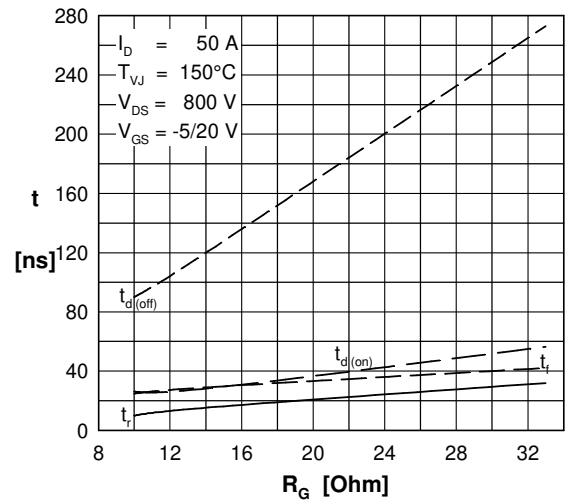


Fig. 16 Typical switching time versus external gate resistor

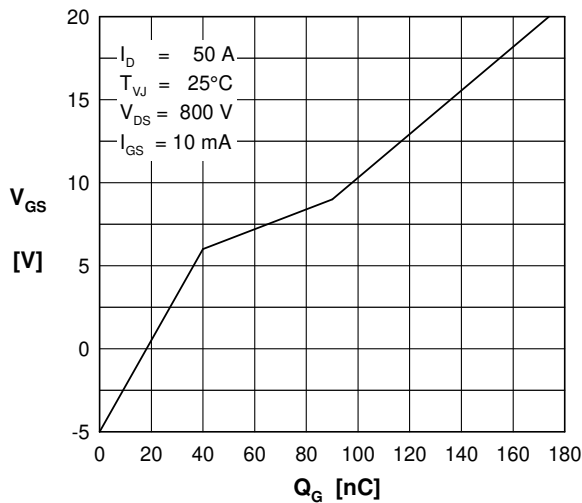


Fig. 17 Typical turn on gate charge, trendline

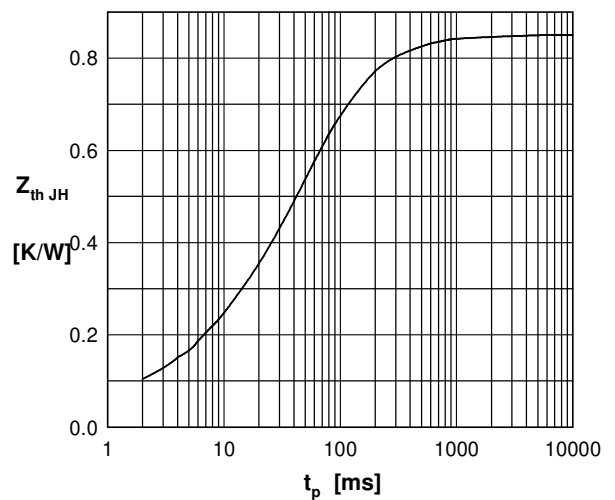


Fig. 18 Typical transient thermal impedance junction to heatsink