

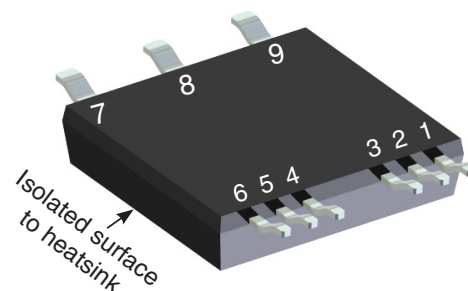
# SiC Power MOSFET

$$I_{D25} = 25.5 \text{ A}$$

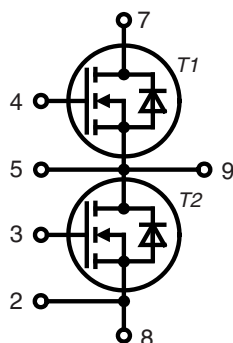
$$V_{DSS} = 1200 \text{ V}$$

$$R_{DS(on) \text{ max}} = 98 \text{ m}\Omega$$

**Part number**  
 MCB20P1200LB



 E72873



## 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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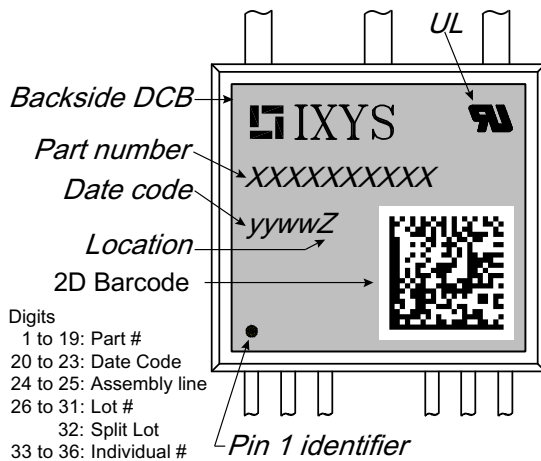
MOSFET			Ratings			
Symbol	Definitions	Conditions	min.	typ.	max.	
$V_{DSS}$	drain source breakdown voltage	$V_{GS} = 0\text{ V}, I_D = 100\ \mu\text{A}$	1200			V
$V_{GSM}$	max transient gate source voltage		-10		+25	V
$V_{GS}$	continous gate source voltage	recommended operational value	-5		+20	V
$I_{D25}$	drain current	$V_{GS} = 20\text{ V}$			25.5	A
$I_{D80}$					20.5	A
$I_{D100}$					18	A
$R_{DSon}$	static drain source on resistance	$I_D = 50\text{ A}; V_{GS} = 20\text{ V}$		80 155	98	mΩ mΩ
$V_{GS(th)}$	gate threshold voltage	$I_D = 5\text{ mA}; V_{GS} = V_{DS}$	2.0	2.6 2.1	4.0	V V
$I_{DSS}$	drain source leakage current	$V_{DS} = 1200\text{ V}; V_{GS} = 0\text{ V}$		2	100	μA
$I_{GSS}$	gate source leakage current	$V_{DS} = 0\text{ V}; V_{GS} = 20\text{ V}$			250	nA
$R_G$	internal gate resistance	$f = 1\text{ MHz}, V_{AC} = 25\text{ mV}, \text{ESR of } C_{ISS}$		4.6		Ω
$C_{ISS}$	input capacitance			950		pF
$C_{OSS}$	output capacitance	$V_{DS} = 1000\text{ V}; V_{GS} = 0\text{ V}; f = 1\text{ MHz}$		80		pF
$C_{rss}$	reverse transfer (Miller) capacitance	$T_{VJ} = 25^\circ\text{C}$		7.6		pF
$Q_g$	total gate charge			62		nC
$Q_{gs}$	gate source charge	$V_{DS} = 800\text{ V}; I_D = 40\text{ A}; V_{GS} = -5/20\text{ V}$		23		nC
$Q_{gd}$	gate drain (Miller) charge	$T_{VJ} = 25^\circ\text{C}$		37		nC
$t_{d(on)}$	turn-on delay time			19		ns
$t_r$	current rise time			7		ns
$t_{d(off)}$	turn-off delay time	Inductive switching		66		ns
$t_f$	current fall time	$V_{DS} = 800\text{ V}; I_D = 20\text{ A}$		23		ns
$E_{on}$	turn-on energy per pulse	$V_{GS} = -5 / 20\text{ V}; R_G = 22\ \Omega$ (external)		0.41		mJ
$E_{off}$	turn-off energy per pulse	Freewheeling diode is Mosfet's body diode		0.21		mJ
$E_{rec(off)}$	reverse recovery losses at turn-off			0.07		mJ
$t_{d(on)}$	turn-on delay time			18		ns
$t_r$	current rise time			7		ns
$t_{d(off)}$	turn-off delay time	Inductive switching		75		ns
$t_f$	current fall time	$V_{DS} = 800\text{ V}; I_D = 20\text{ A}$		21		ns
$E_{on}$	turn-on energy per pulse	$V_{GS} = -5 / 20\text{ V}; R_G = 22\ \Omega$ (external)		0.49		mJ
$E_{off}$	turn-off energy per pulse	Freewheeling diode is Mosfet's body diode		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	$I_F = 10\text{ A}; V_{GS} = -5\text{ V}$		3.3 3.1		V V
$t_{rr}$	reverse recovery time			15		ns
$Q_{RM}$	reverse recovery charge (intrinsic diode)	$V_{GS} = -5\text{ V}; I_F = 20\text{ A}; V_R = 800\text{ V}$		0.20		μC
$I_{RM}$	max. reverse recovery current	Mosfet gate drive:		23		A
$di_F/dt$	current slew rate	$V_{GS} = -5 / 20\text{ V}; R_G = 22\ \Omega$		3650		A/μs
$t_{rr}$	reverse recovery time			19		ns
$Q_{RM}$	reverse recovery charge (intrinsic diode)	$V_{GS} = -5\text{ V}; I_F = 20\text{ A}; V_R = 800\text{ V}$		0.42		μC
$I_{RM}$	max. reverse recovery current	Mosfet gate drive:		35		A
$di_F/dt$	current slew rate	$V_{GS} = -5 / 20\text{ V}; R_G = 22\ \Omega$		4120		A/μs

**Note:**

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

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
$d_{Spb/Appb}$	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 #

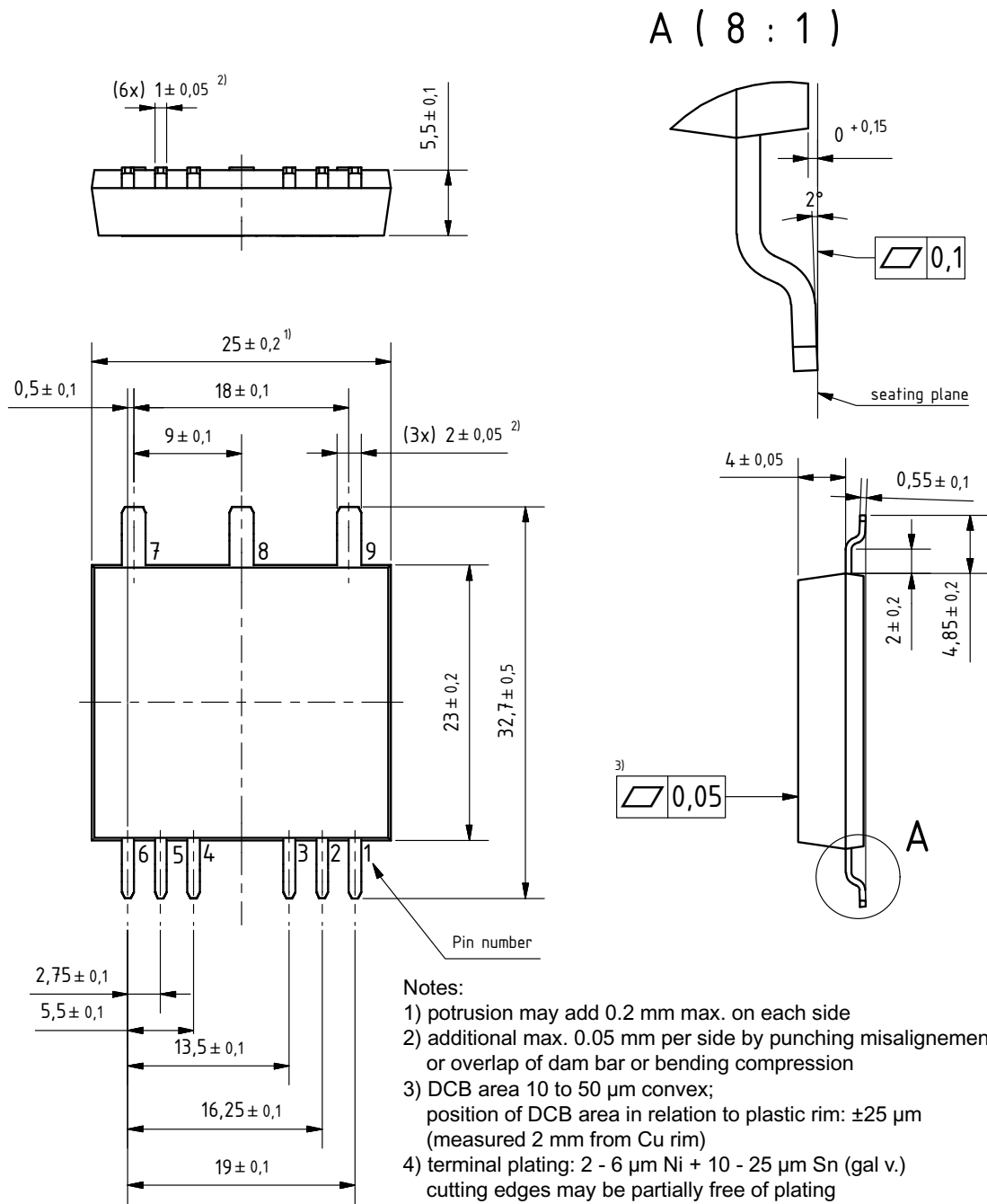
32: Split Lot

33 to 36: Individual #

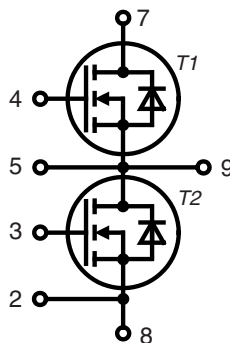
**Part number**

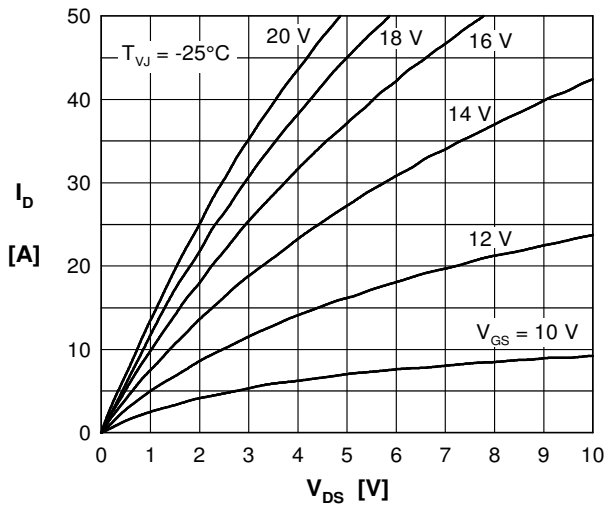
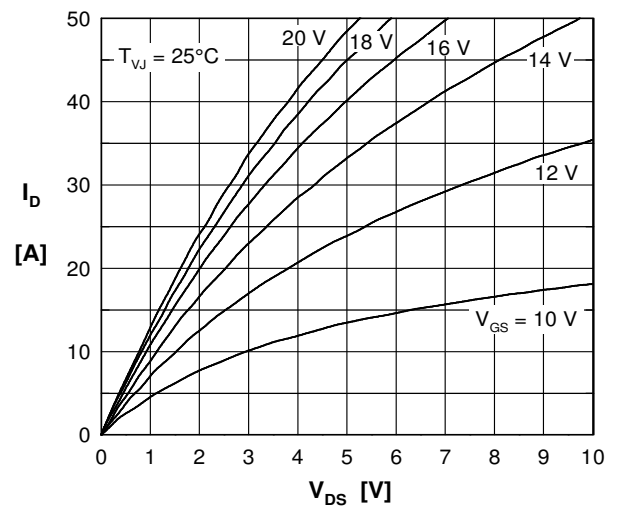
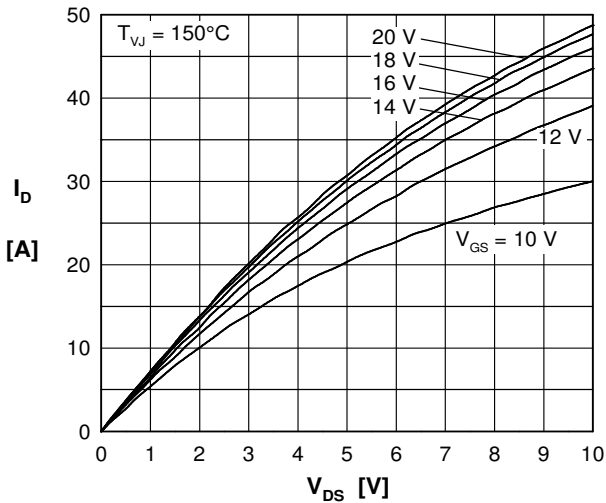
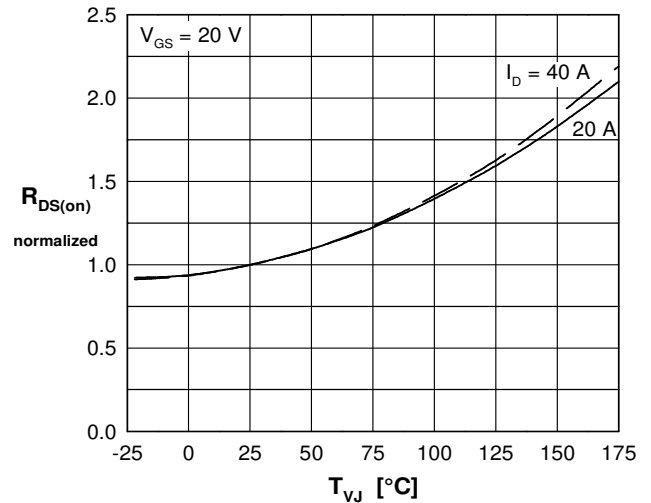
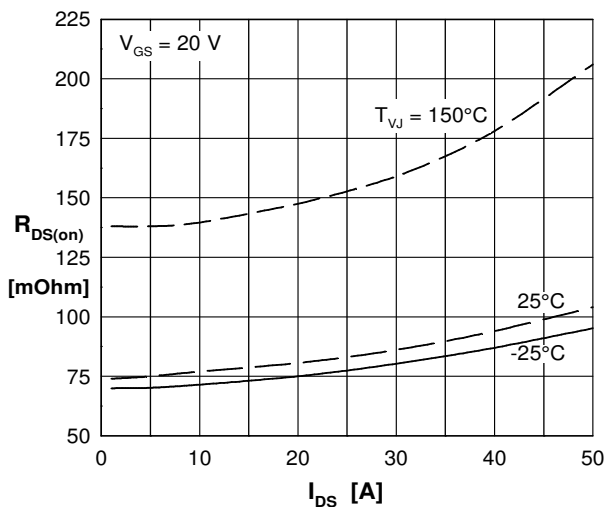
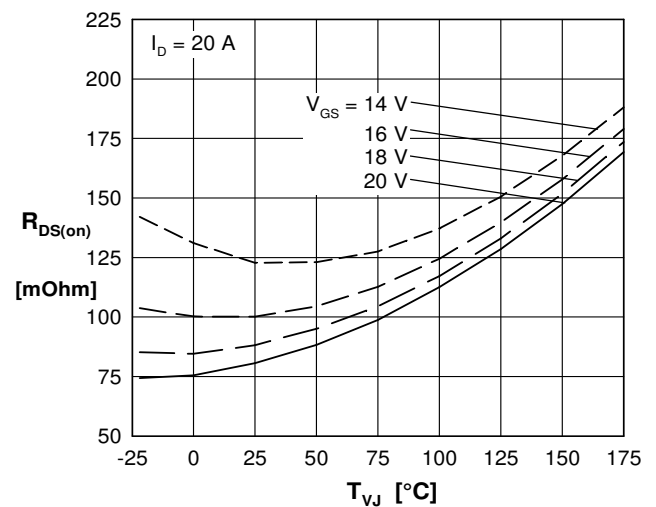
M = Mosfet  
 C = SiC MOSFET  
 B = Generation 2  
 20 = Current Rating [A]  
 P = Phase leg  
 1200 = Reverse Voltage [V]  
 LB = SMPD-B

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**


**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  $T_{VJ}$

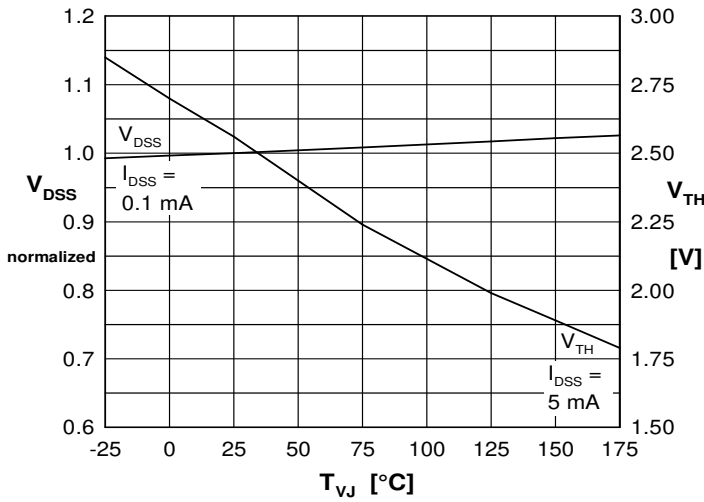
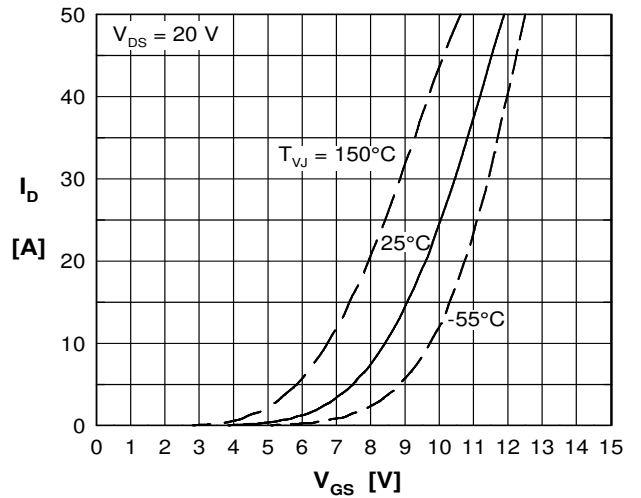
**Curves**

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


Fig. 8 Typical transfer characteristics

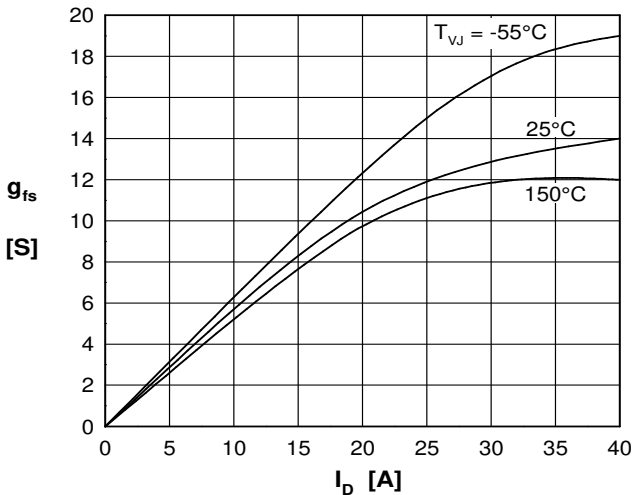
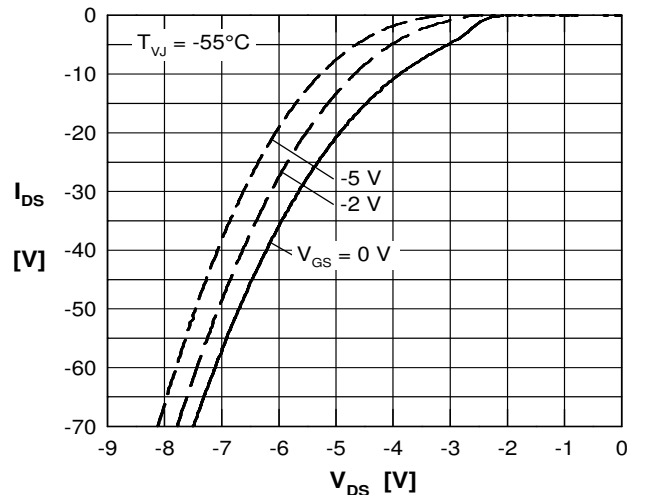
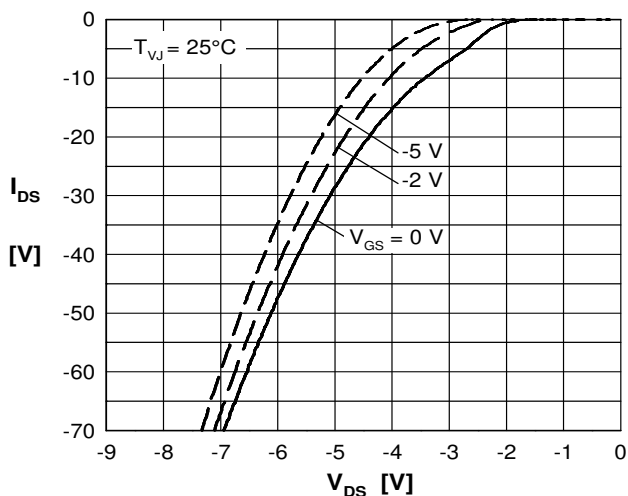
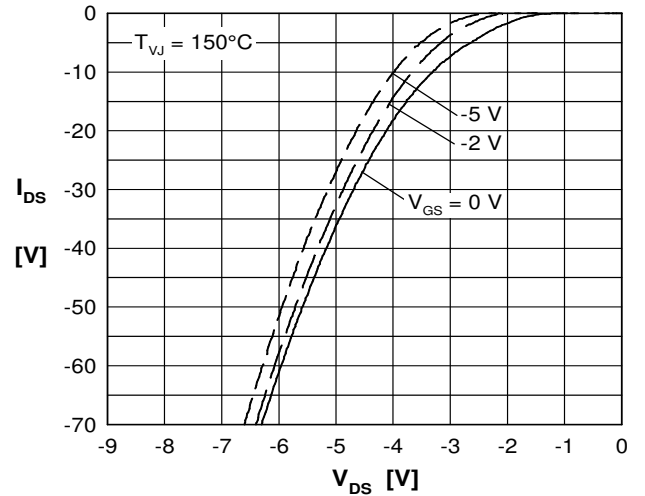


Fig. 9 Typical forward transconductance


 Fig. 10 Forward voltage drop of intrinsic diode versus  $V_{DS}$  measured at  $-55^{\circ}\text{C}$ 

 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  $150^{\circ}\text{C}$

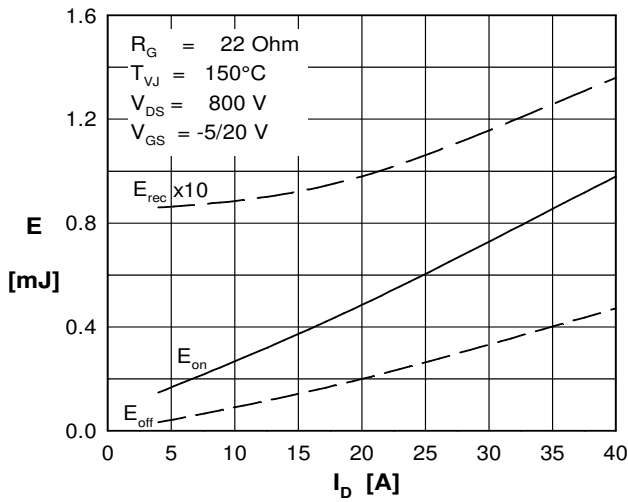
**Curves**


Fig. 13 Typical switching energy versus drain current

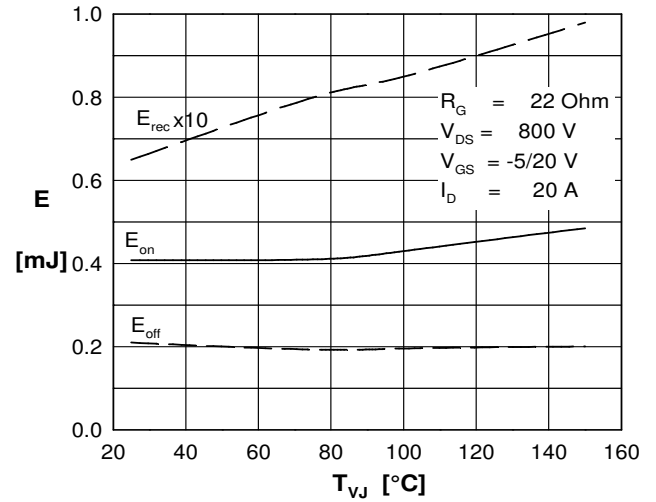


Fig. 14 Typical switching energy versus temperature

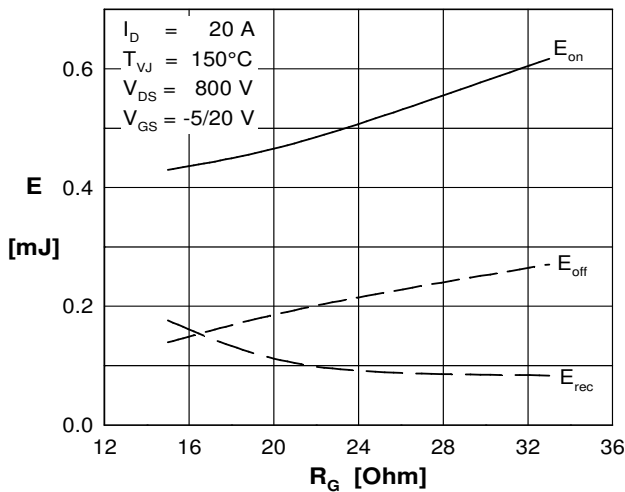


Fig. 15 Typical switching energy versus external gate resistor

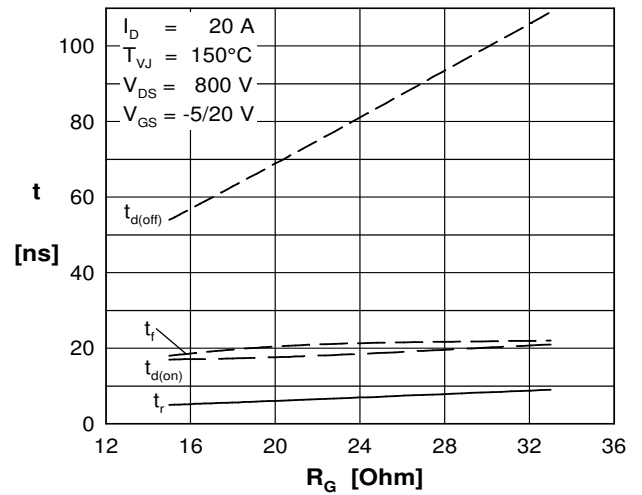


Fig. 16 Typical switching time versus external gate resistor

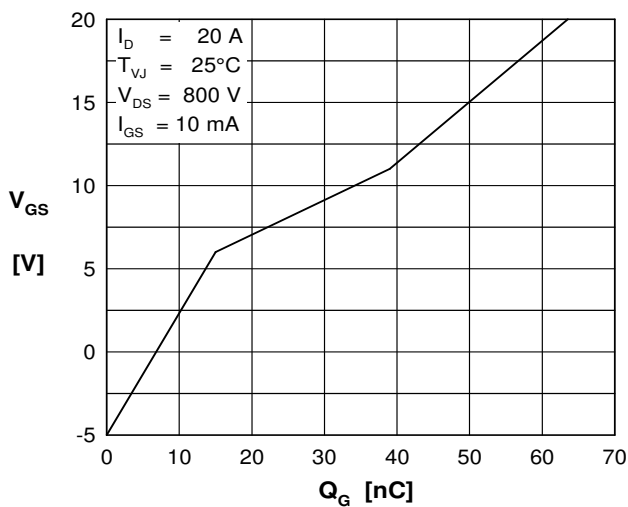


Fig. 17 Typical turn on gate charge, trendline

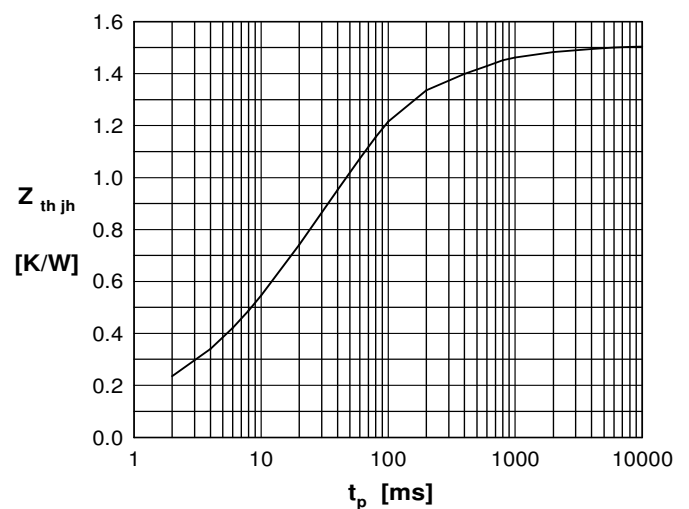


Fig. 18 Typical transient thermal impedance