

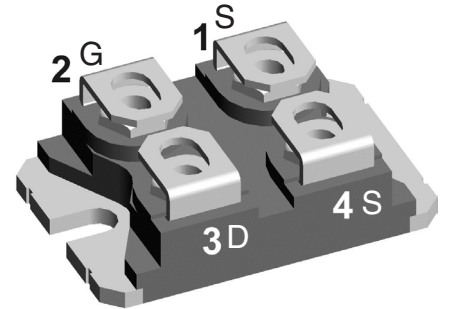
# SiC Power MOSFET

$$I_{D25} = 47 \text{ A}$$

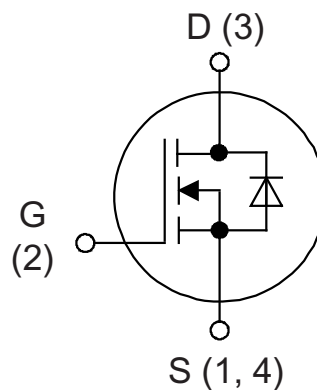
$$V_{DSS} = 1200 \text{ V}$$

$$R_{DS(on) \text{ max}} = 50 \text{ m}\Omega$$

**Part number**  
IXFN50N120SiC



Backside: isolated  
 E72873



### Features / Advantages:

- High speed switching with low capacitances
- High blocking voltage with low  $R_{DS(on)}$
- Easy to parallel and simple to drive
- Avalanche ruggedness
- Resistant to latch-up

### Applications:

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

### Package: SOT-227B (minibloc)

- Isolation Voltage: 2500 V~
- Industry standard outline
- RoHS compliant
- Epoxy meets UL 94V-0
- Base plate with Aluminium nitride isolation
- Advanced power cycling

### Disclaimer Notice

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MOSFET			Ratings							
Symbol	Definitions	Conditions	min.	typ.	max.					
$V_{DSS}$	drain source breakdown voltage	$V_{GS} = 0\text{ V}$ , $I_D = 200\ \mu\text{A}$	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	$V_{GS} = 20\text{ V}$				$T_C = 25^\circ\text{C}$				
$I_{D80}$						$T_C = 80^\circ\text{C}$				
$I_{D100}$						$T_C = 100^\circ\text{C}$				
$I_{D(pulse)}$	pulsed drain current	pulse width limited by $T_{VJ\ max}$			125	A				
$P_D$	power dissipation				270	W				
$R_{DSon}$	static drain source on resistance	$I_D = 40\text{ A}$ ; $V_{GS} = 20\text{ V}$				$T_{VJ} = 25^\circ\text{C}$				
						$T_{VJ} = 150^\circ\text{C}$				
$V_{GS(th)}$	gate threshold voltage	$I_D = 10\text{ mA}$ ; $V_{GS} = V_{DS}$	2.0	2.6	4.0	$T_{VJ} = 25^\circ\text{C}$				
						$T_{VJ} = 150^\circ\text{C}$				
$I_{DSS}$	drain source leakage current	$V_{DS} = 1200\text{ V}$ ; $V_{GS} = 0\text{ V}$			2	$T_{VJ} = 25^\circ\text{C}$				
						$T_{VJ} = 150^\circ\text{C}$				
$I_{GSS}$	gate source leakage current	$V_{DS} = 0\text{ V}$ ; $V_{GS} = 20\text{ V}$			0.5	$\mu\text{A}$				
$R_G$	internal gate resistance				4.8	$\Omega$				
$C_{iss}$	input capacitance	$V_{DS} = 1000\text{ V}$ ; $V_{GS} = 0\text{ V}$ ; $f = 1\text{ MHz}$			1900	$T_{VJ} = 25^\circ\text{C}$				
$C_{oss}$						output capacitance	160			
$C_{rss}$						reverse transfer (Miller) capacitance	13			
$Q_g$	total gate charge	$V_{DS} = 800\text{ V}$ ; $I_D = 40\text{ A}$ ; $V_{GS} = 0/20\text{ V}$			100	$T_{VJ} = 25^\circ\text{C}$				
$Q_{gs}$	gate source charge					22				
$Q_{gd}$	gate drain (Miller) charge					36				
$t_{d(on)}$	turn-on delay time	Inductive switching $V_{DS} = 800\text{ V}$ ; $I_D = 40\text{ A}$ $V_{GS} = -5 / 20\text{ V}$ ; $R_G = 10\ \Omega$ (external) Freewheeling diode is Mosfet's body diode				$T_{VJ} = 25^\circ\text{C}$				
$t_r$	current rise time					23				
$t_{d(off)}$	turn-off delay time					9				
$t_f$	current fall time					75				
$E_{on}$	turn-on energy per pulse					19				
$E_{off}$	turn-off energy per pulse					1.08				
$E_{rec(off)}$	reverse recovery losses at turn-off					0.29				
						0.04				
$t_{d(on)}$	turn-on delay time					Inductive switching $V_{DS} = 800\text{ V}$ ; $I_D = 40\text{ A}$ $V_{GS} = -5 / 20\text{ V}$ ; $R_G = 10\ \Omega$ (external) Freewheeling diode is Mosfet's body diode				$T_{VJ} = 150^\circ\text{C}$
$t_r$	current rise time									23
$t_{d(off)}$	turn-off delay time	9								
$t_f$	current fall time	100								
$E_{on}$	turn-on energy per pulse	22								
$E_{off}$	turn-off energy per pulse	1.48								
$E_{rec(off)}$	reverse recovery losses at turn-off	0.35								
		0.10								
$R_{thJC}$	thermal resistance junction to case				0.55					K/W
$R_{thJH}$	thermal resistance junction to heatsink	with heatsink compound; IXYS test setup			0.62					K/W

Source-Drain Diode			Ratings			
Symbol	Definitions	Conditions	min.	typ.	max.	
$V_{SD}$	forward voltage drop	$I_F = 40\text{ A}$ ; $V_{GS} = -5\text{ V}$		5.2		V
				4.6		V
$t_{rr}$	reverse recovery time	$V_{GS} = -5\text{ V}$ ; $I_F = 40\text{ A}$ ; $V_R = 800\text{ V}$ Mosfet gate drive: $V_{GS} = -5 / 20\text{ V}$ ; $R_G = 10\ \Omega$				$T_{VJ} = 25^\circ\text{C}$
$Q_{RM}$	reverse recovery charge (intrinsic diode)					16
$I_{RM}$	max. reverse recovery current					330
$dI_F/dt$	current slew rate					35
					4800	A/ $\mu\text{s}$
$t_{rr}$	reverse recovery time	$V_{GS} = -5\text{ V}$ ; $I_F = 40\text{ A}$ ; $V_R = 800\text{ V}$ Mosfet gate drive: $V_{GS} = -5 / 20\text{ V}$ ; $R_G = 10\ \Omega$				$T_{VJ} = 150^\circ\text{C}$
$Q_{RM}$	reverse recovery charge (intrinsic diode)					26
$I_{RM}$	max. reverse recovery current					810
$dI_F/dt$	current slew rate					45
					4600	A/ $\mu\text{s}$

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

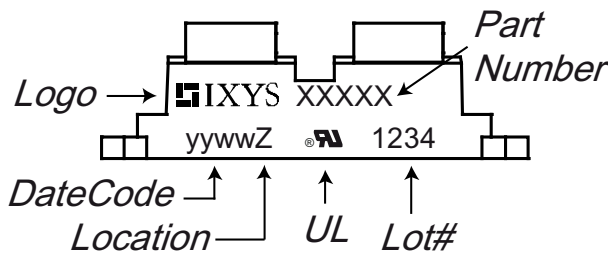
IXYS reserves the right to change limits, test conditions and dimensions.

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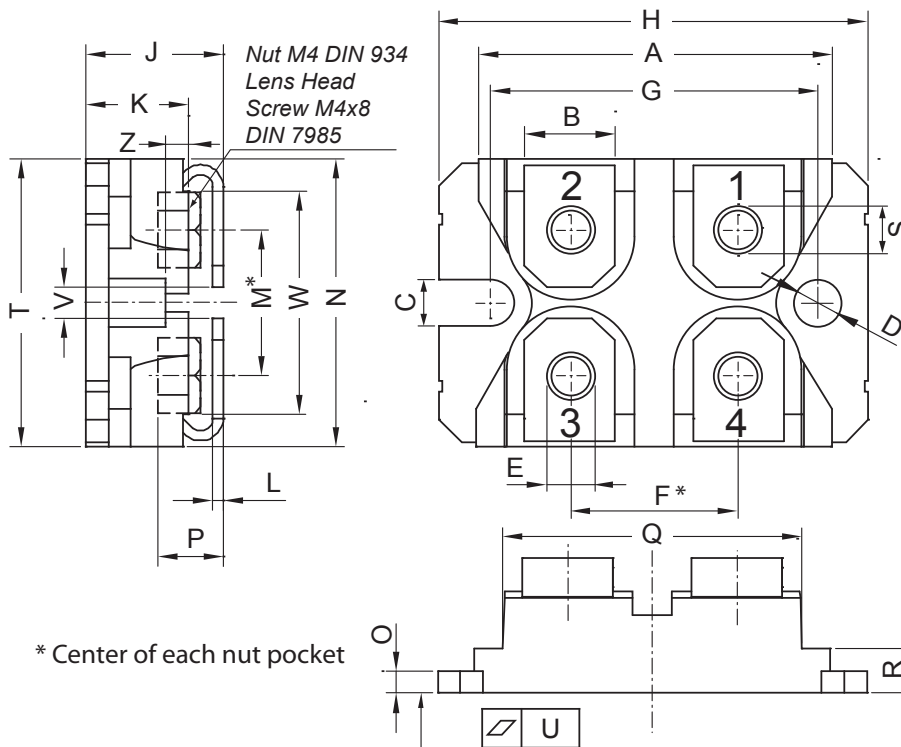
Package Outlines SOT-227B (minibloc)			Ratings			
Symbol	Definitions	Conditions	min.	typ.	max.	Unit
$I_{RMS}$	RMS current	per terminal			100	A
$T_{stg}$	storage temperature		-40		150	°C
$T_{op}$	operation temperature		-40		150	°C
$T_{vJ}$	virtual junction temperature		-40		175	°C
<b>Weight</b>				30		g
$M_D$	mounting torque <sup>1)</sup>	screws to heatsink terminal connection screws			1.5 1.3	Nm Nm
$d_{Spp}$	creepage distance on surface	terminal to terminal	10.5			mm
$d_{Spb}$		terminal to backside	8.5			mm
$d_{App}$	striking distance through air	terminal to terminal	3.2			mm
$d_{Apb}$		terminal to backside	6.8			mm
$V_{ISOL}$	isolation voltage	$I_{ISOL} \leq 1 \text{ mA}; 50/60 \text{ Hz}$	3000 2500			V V
$C_p$	coupling capacity per switch	between drain and back side metallization with gate and source shorted		42		pF

<sup>1)</sup> further information see application note IXAN0073 on [www.ixys.com/TechnicalSupport/appnotes.aspx](http://www.ixys.com/TechnicalSupport/appnotes.aspx) (General / Isolation, Mounting, Soldering, Cooling)

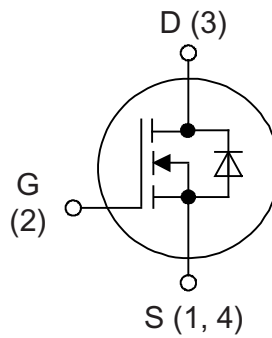
## Product Marking

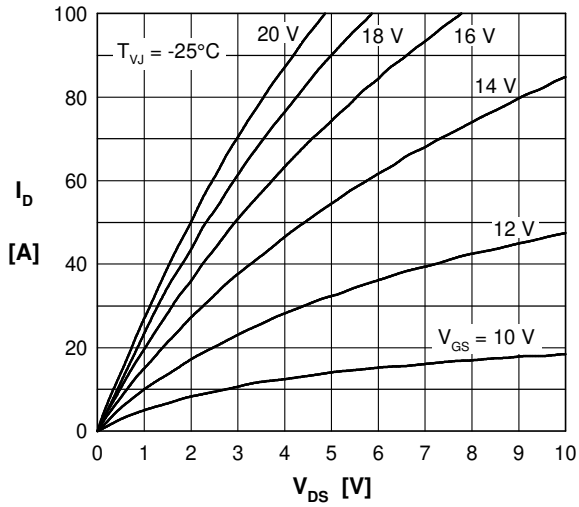
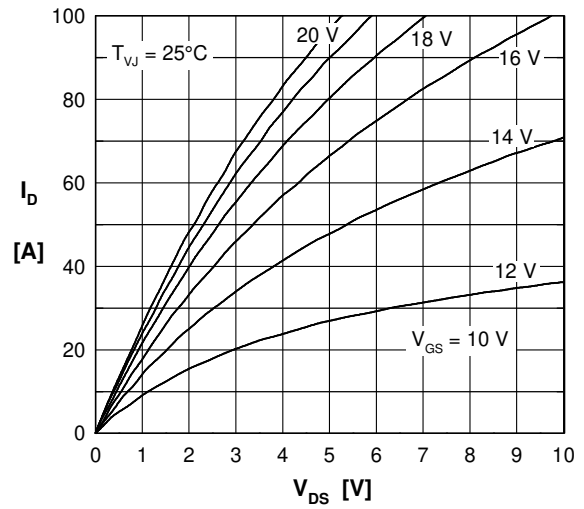
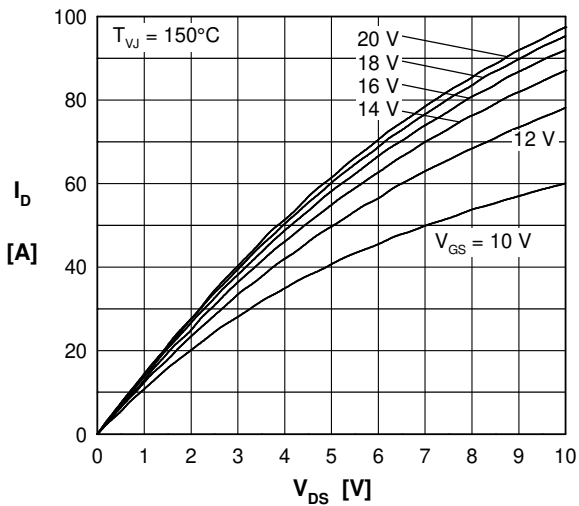
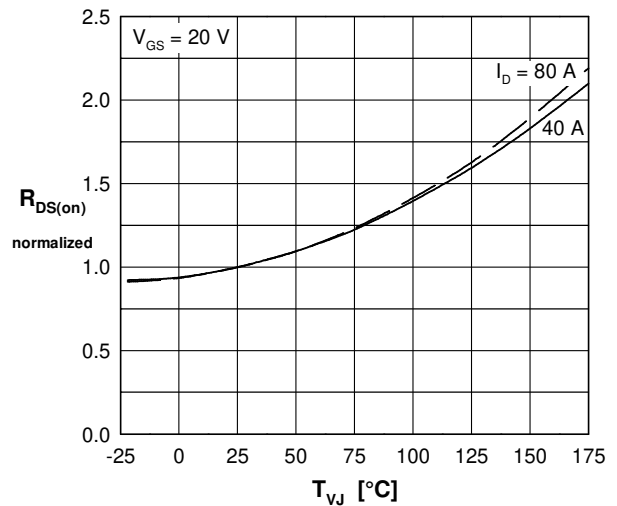
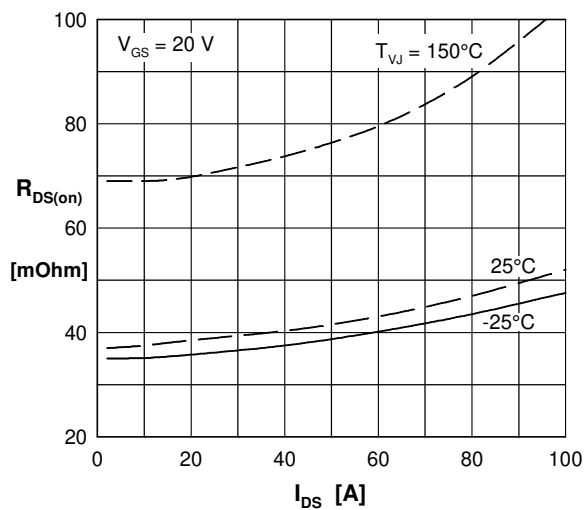
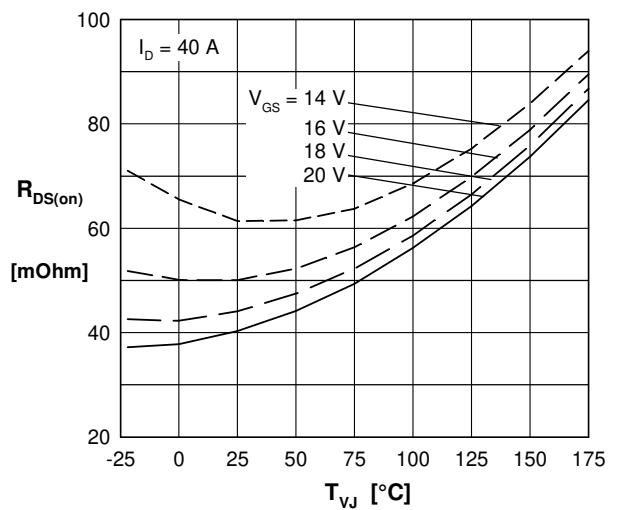


Ordering	Part Name	Marking on Product	Delivering Mode	Base Qty	Ordering Code
Standard	IXFN50N120SiC	IXFN50N120SiC	Tube	10	IXFN50N120SiC

**Outlines SOT-227B (minibloc)**


Dim.	Millimeter		Inches	
	min	max	min	max
A	31.50	31.88	1.240	1.255
B	7.80	8.20	0.307	0.323
C	4.09	4.29	0.161	0.169
D	4.09	4.29	0.161	0.169
E	4.09	4.29	0.161	0.169
F	14.91	15.11	0.587	0.595
G	30.12	30.30	1.186	1.193
H	37.80	38.23	1.488	1.505
J	11.68	12.22	0.460	0.481
K	8.92	9.60	0.351	0.378
L	0.74	0.84	0.029	0.033
M	12.50	13.10	0.492	0.516
N	25.15	25.42	0.990	1.001
O	1.95	2.13	0.077	0.084
P	4.95	6.20	0.195	0.244
Q	26.54	26.90	1.045	1.059
R	3.94	4.42	0.155	0.167
S	4.55	4.85	0.179	0.191
T	24.59	25.25	0.968	0.994
U	-0.05	0.10	-0.002	0.004
V	3.20	5.50	0.126	0.217
W	19.81	21.08	0.780	0.830
Z	2.50	2.70	0.098	0.106



**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  $T_{VJ}$

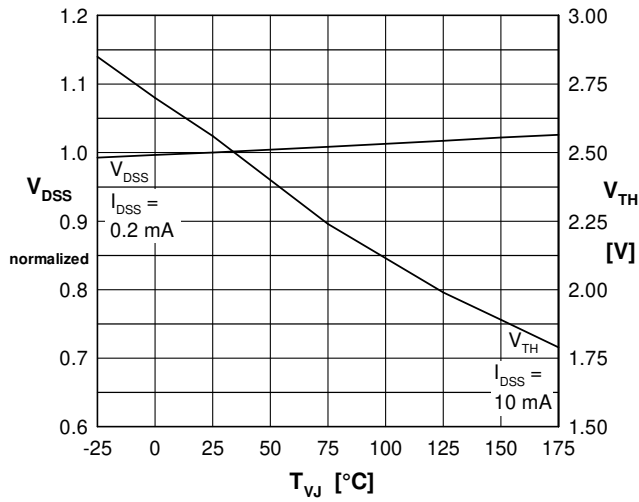
**Curves**


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

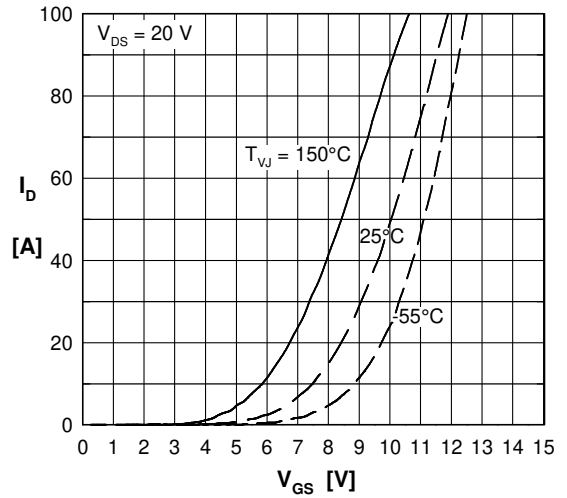


Fig. 8 Typical transfer characteristics

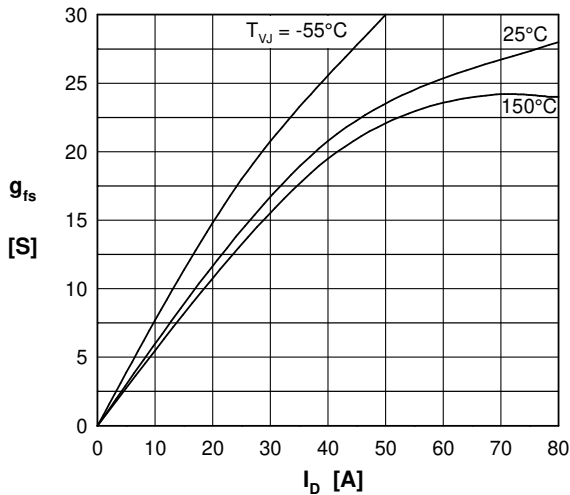


Fig. 9 Typical forward transconductance

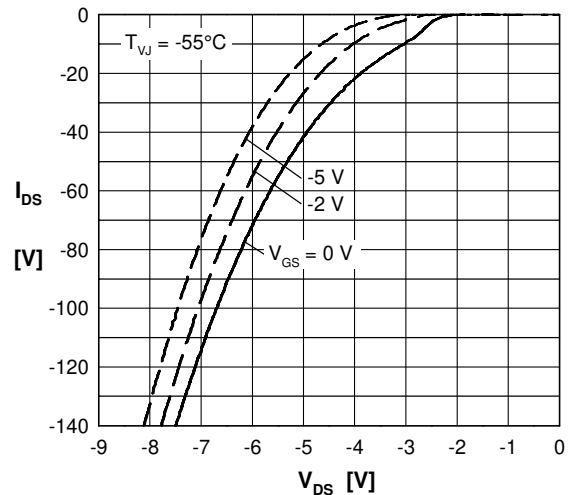


Fig. 10 Forward voltage drop of intrinsic diode versus  $V_{DS}$  measured at  $-55^{\circ}\text{C}$

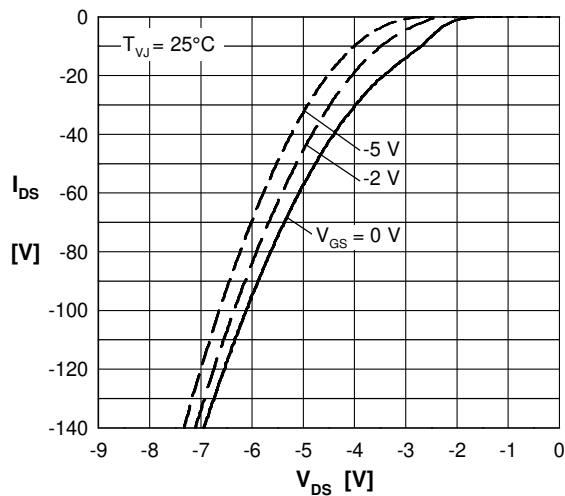


Fig. 11 Forward voltage drop of intrinsic diode versus  $V_{DS}$  measured at  $25^{\circ}\text{C}$

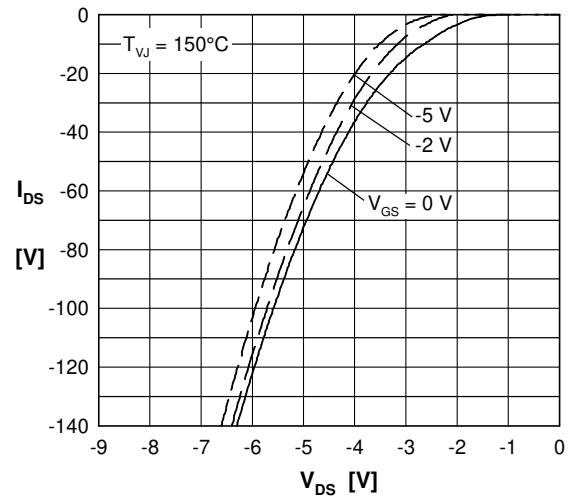


Fig. 12 Forward voltage drop of intrinsic diode versus  $V_{DS}$  measured at  $150^{\circ}\text{C}$

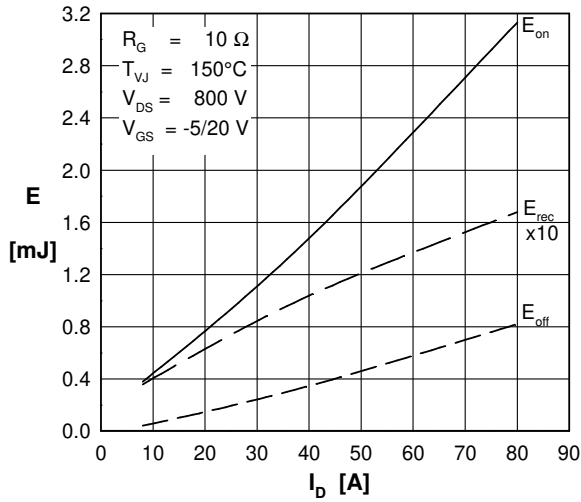
**Curves**


Fig. 13 Typical switching energy versus drain current

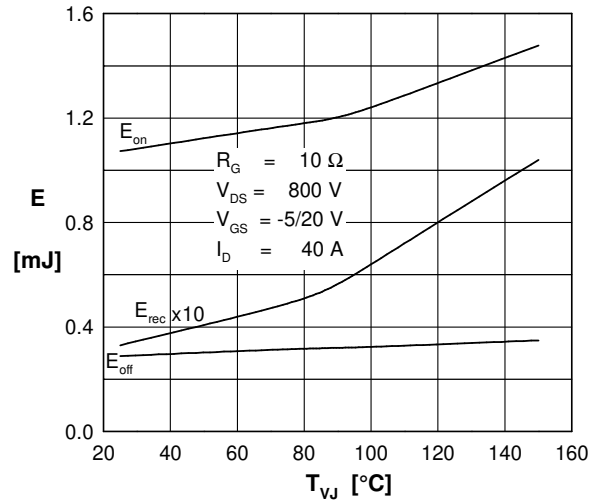


Fig. 14 Typical switching energy versus temperature

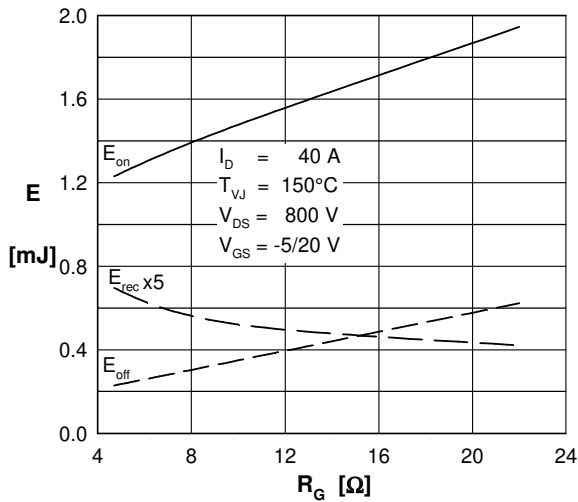


Fig. 15 Typical switching energy versus external gate resistor

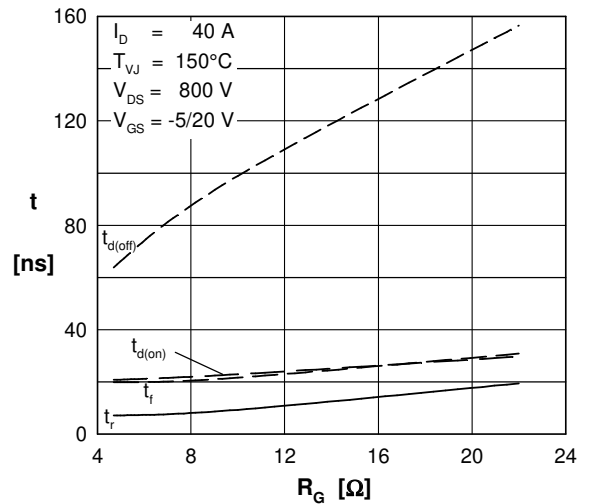


Fig. 16 Typical switching time versus external gate resistor

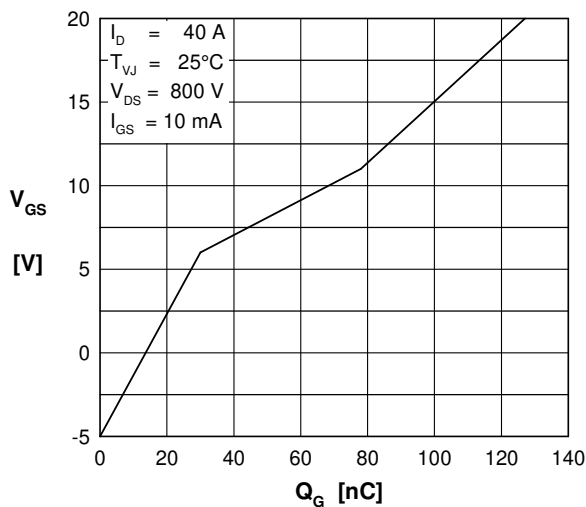


Fig. 17 Typical turn on gate charge, trendline

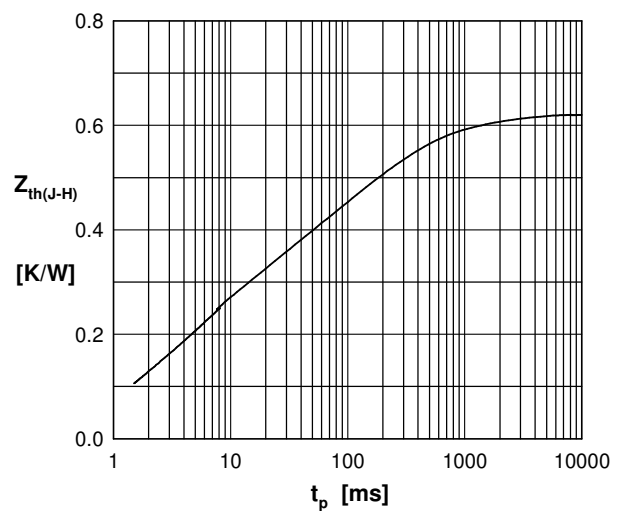


Fig. 18 Typical transient thermal impedance