

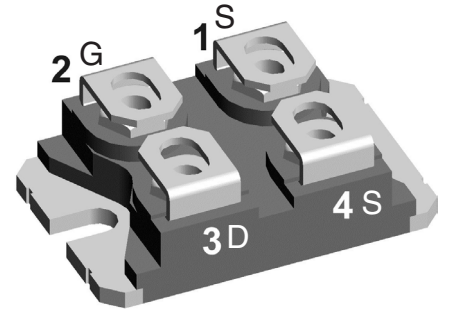
# SiC Power MOSFET

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

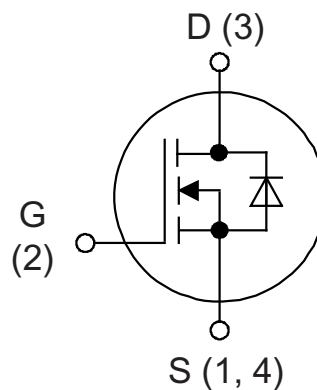
$$V_{DSS} = 1200 \text{ V}$$

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

**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	$V_{DS} = 1200\text{ V}; V_{GS} = 0\text{ V}$				$T_{VJ} = 25^\circ\text{C}$									
						$T_{VJ} = 150^\circ\text{C}$									
$I_{GSS}$	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	$V_{DS} = 1000\text{ V}; V_{GS} = 0\text{ V}; f = 1\text{ MHz}$				$T_{VJ} = 25^\circ\text{C}$									
$C_{oss}$						output capacitance	1900	pF							
$C_{rss}$						reverse transfer (Miller) capacitance	160	pF							
$Q_g$	total gate charge	$V_{DS} = 800\text{ V}; I_D = 40\text{ A}; V_{GS} = 0/20\text{ V}$				$T_{VJ} = 25^\circ\text{C}$									
$Q_{gs}$						gate source charge	100	nC							
$Q_{gd}$						gate drain (Miller) charge	22	nC							
$t_{d(on)}$	turn-on delay time	Inductive switching	$V_{DS} = 800\text{ V}; I_D = 40\text{ A}$	$T_{VJ} = 25^\circ\text{C}$											
$t_r$							current rise time	9	ns						
$t_{d(off)}$							turn-off delay time	75	ns						
$t_f$							current fall time	19	ns						
$E_{on}$							turn-on energy per pulse	1.08	mJ						
$E_{off}$							turn-off energy per pulse	0.29	mJ						
$E_{rec(off)}$							reverse recovery losses at turn-off	0.04	mJ						
$t_{d(on)}$							turn-on delay time	Inductive switching	$V_{DS} = 800\text{ V}; I_D = 40\text{ A}$	$T_{VJ} = 150^\circ\text{C}$					
$t_r$													current rise time	9	ns
$t_{d(off)}$													turn-off delay time	100	ns
$t_f$	current fall time	22	ns												
$E_{on}$	turn-on energy per pulse	1.48	mJ												
$E_{off}$	turn-off energy per pulse	0.35	mJ												
$E_{rec(off)}$	reverse recovery losses at turn-off	0.10	mJ												
$R_{thJC}$	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	$V_{GS} = -5\text{ V}; I_F = 40\text{ A}; V_R = 800\text{ V}$				
$Q_{RM}$	reverse recovery charge (intrinsic diode)					
$I_{RM}$	max. reverse recovery current	$V_{GS} = -5 / 20\text{ V}; R_G = 10\ \Omega$				
$dI_F/dt$	current slew rate					
				35		A
				4800		A/ $\mu\text{s}$
$t_{rr}$	reverse recovery time	$V_{GS} = -5\text{ V}; I_F = 40\text{ A}; V_R = 800\text{ V}$				
$Q_{RM}$	reverse recovery charge (intrinsic diode)					
$I_{RM}$	max. reverse recovery current	$V_{GS} = -5 / 20\text{ V}; R_G = 10\ \Omega$				
$dI_F/dt$	current slew rate					
				45		A
				4600		A/ $\mu\text{s}$

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

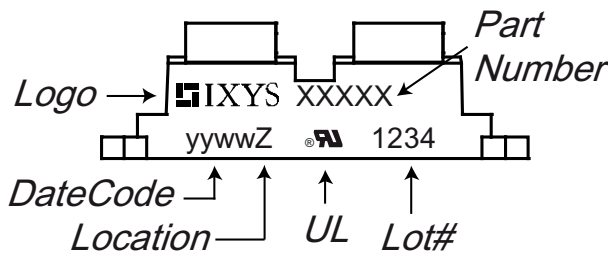
IXYS reserves the right to change limits, test conditions and dimensions.

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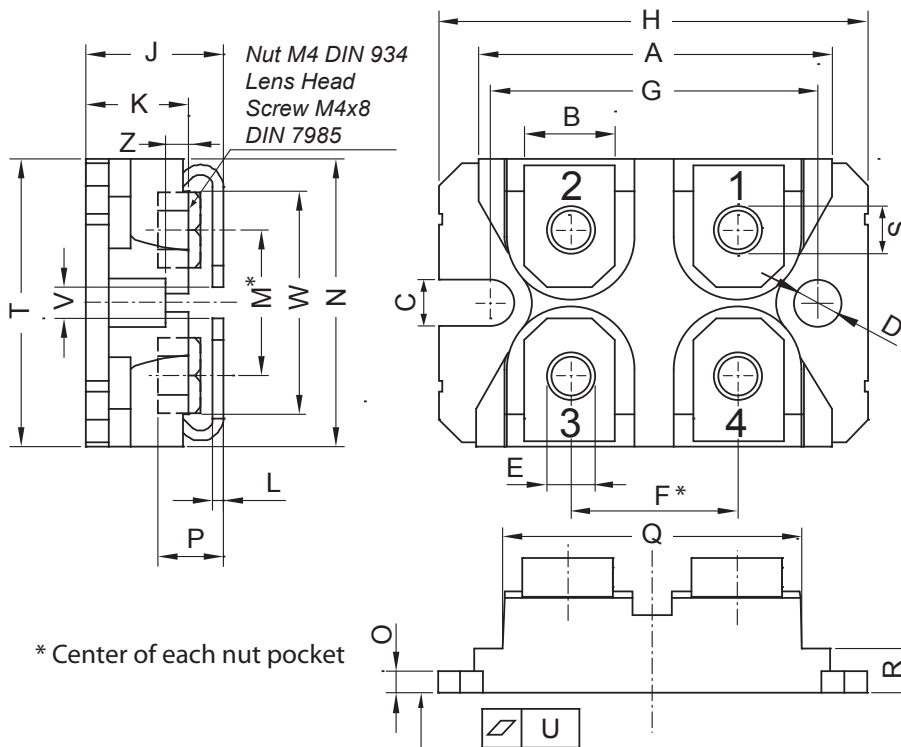
Package Outlines SOT-227B (minibloc)			Ratings			
Symbol	Definitions	Conditions	min.	typ.	max.	Unit
$I_{RMS}$	RMS current	per terminal			100	A
$T_{stg}$	storage temperature		-40		150	°C
$T_{op}$	operation temperature		-40		150	°C
$T_{vJ}$	virtual junction temperature		-40		175	°C
<b>Weight</b>				30		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)

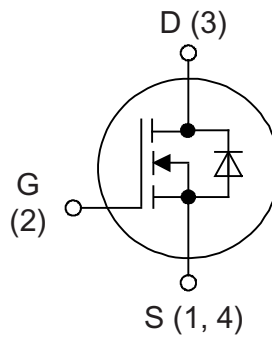
## Product Marking

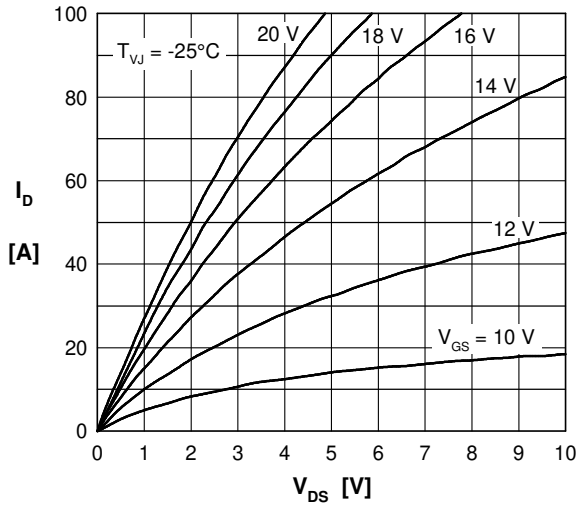
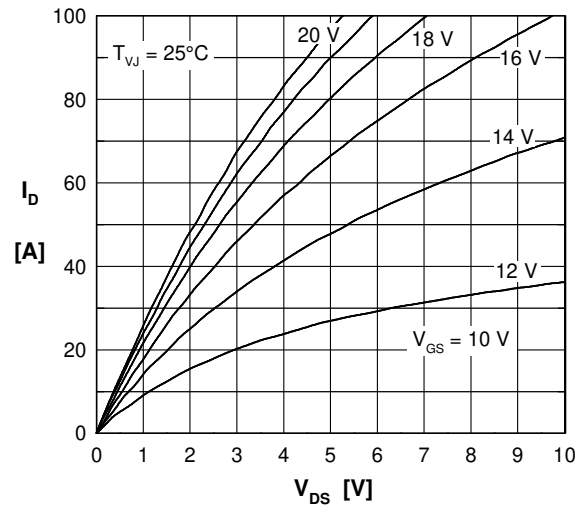
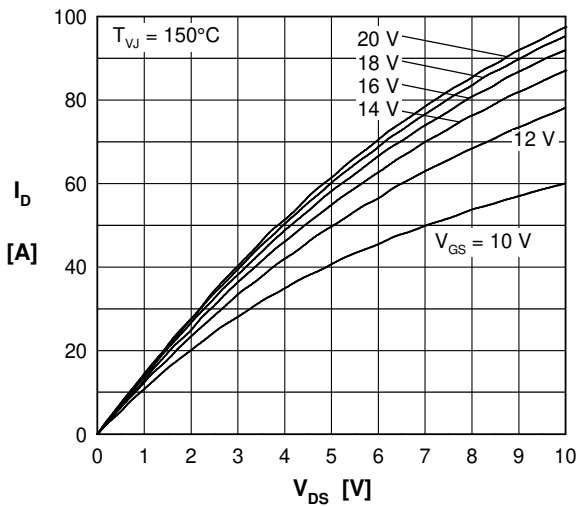
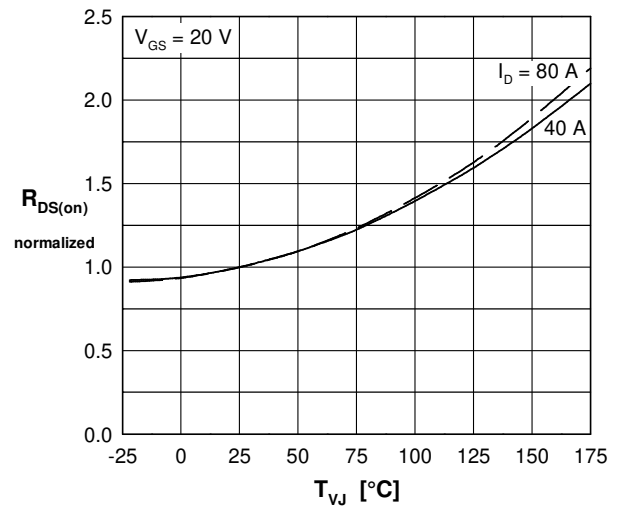
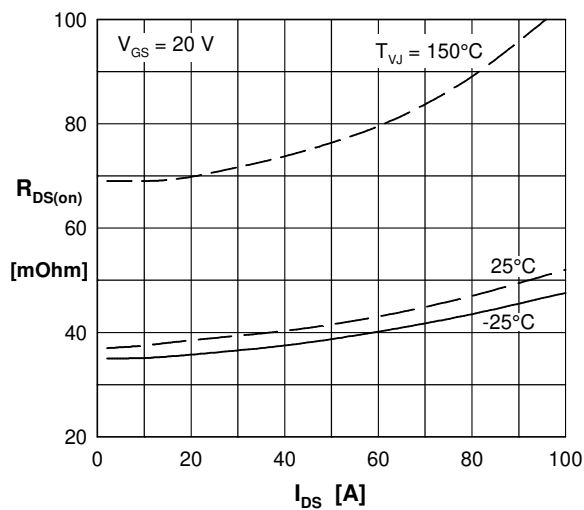
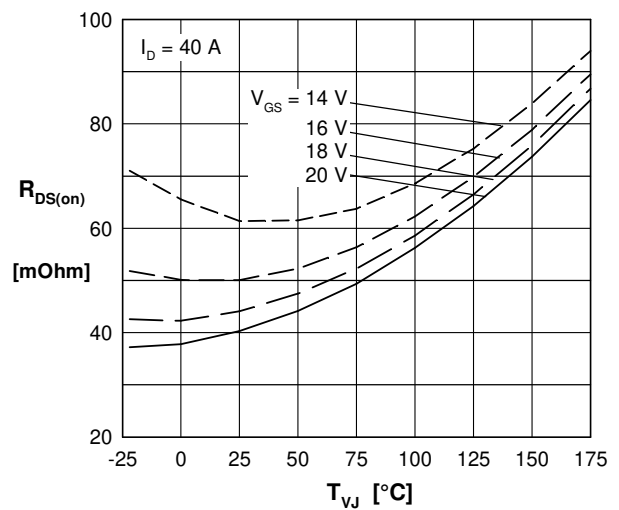


Ordering	Part Name	Marking on Product	Delivering Mode	Base Qty	Ordering Code
Standard	IXFN50N120SiC	IXFN50N120SiC	Tube	10	IXFN50N120SiC

**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  $T_{VJ}$

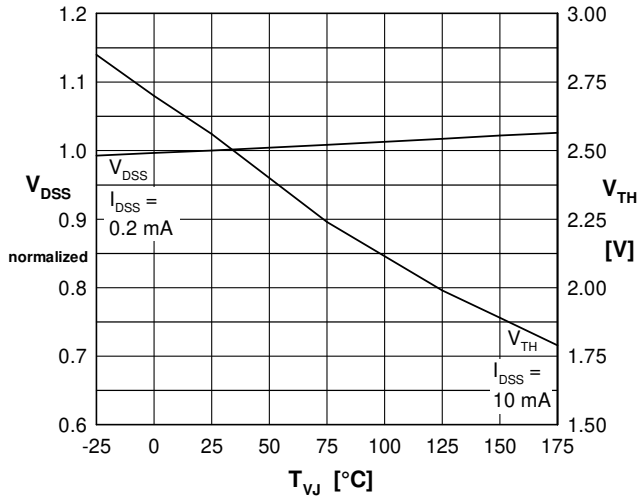
**Curves**


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

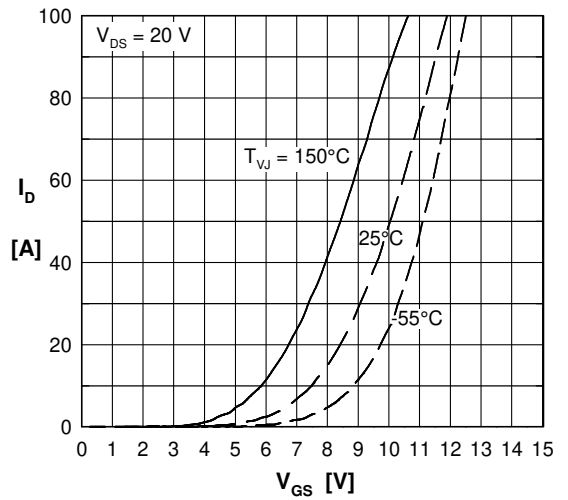


Fig. 8 Typical transfer characteristics

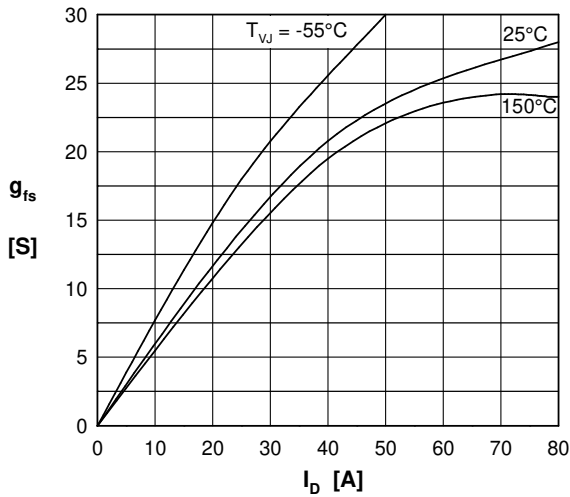


Fig. 9 Typical forward transconductance

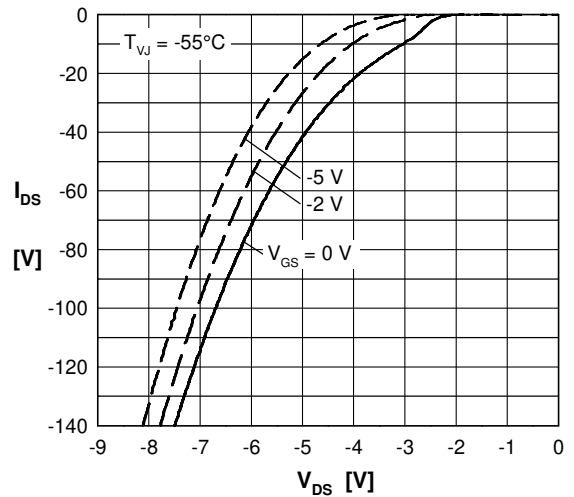


Fig. 10 Forward voltage drop of intrinsic diode versus  $V_{DS}$  measured at  $-55^{\circ}\text{C}$

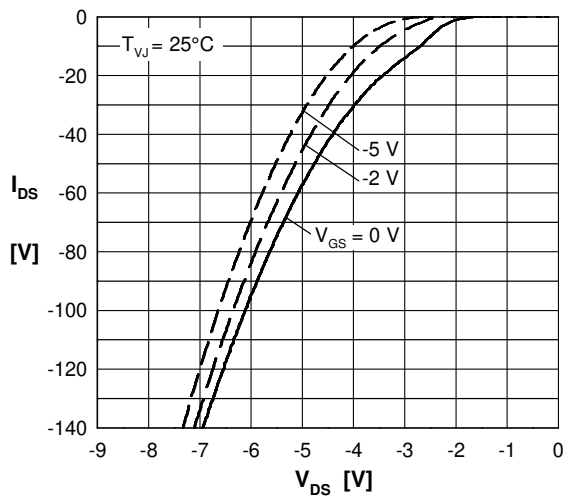


Fig. 11 Forward voltage drop of intrinsic diode versus  $V_{DS}$  measured at  $25^{\circ}\text{C}$

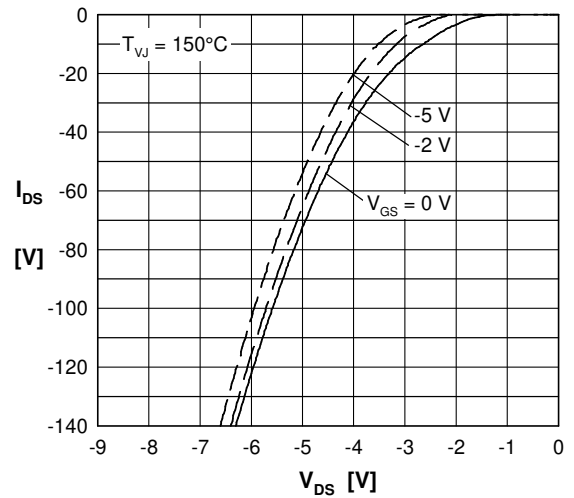


Fig. 12 Forward voltage drop of intrinsic diode versus  $V_{DS}$  measured at  $150^{\circ}\text{C}$

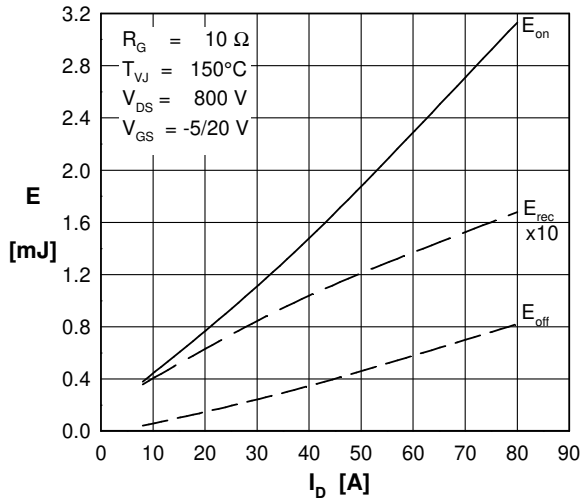
**Curves**


Fig. 13 Typical switching energy versus drain current

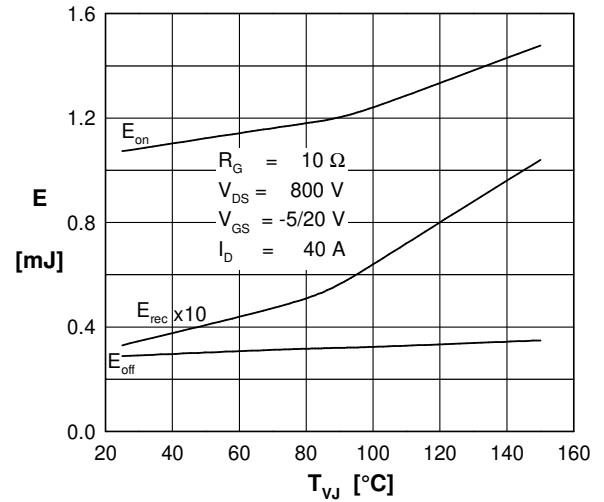


Fig. 14 Typical switching energy versus temperature

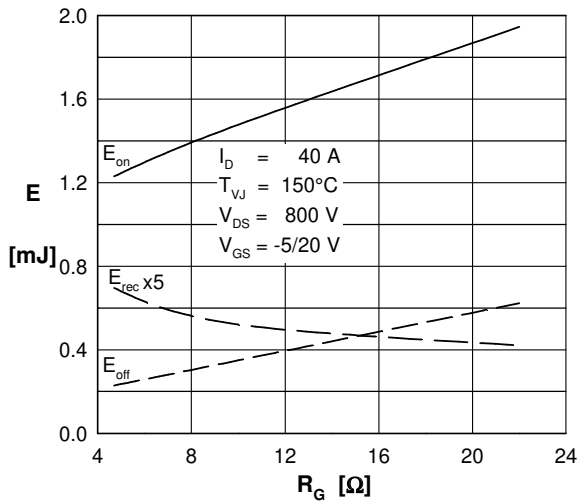


Fig. 15 Typical switching energy versus external gate resistor

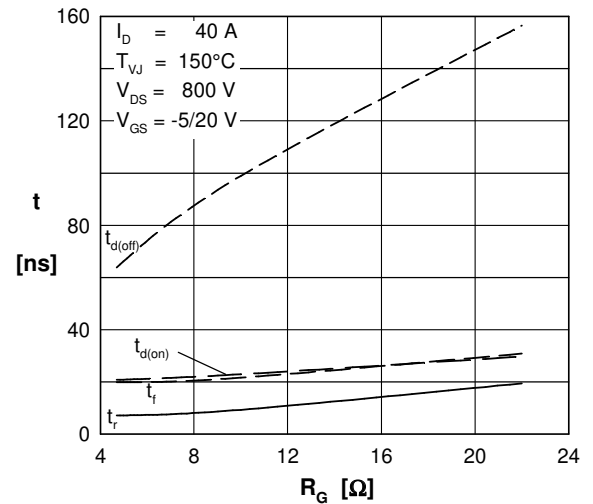


Fig. 16 Typical switching time versus external gate resistor

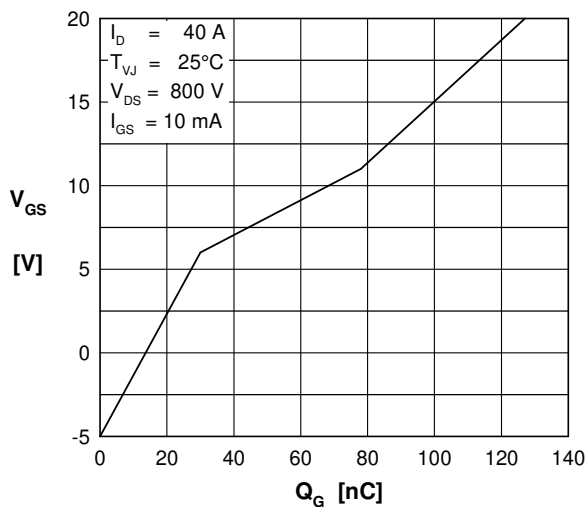


Fig. 17 Typical turn on gate charge, trendline

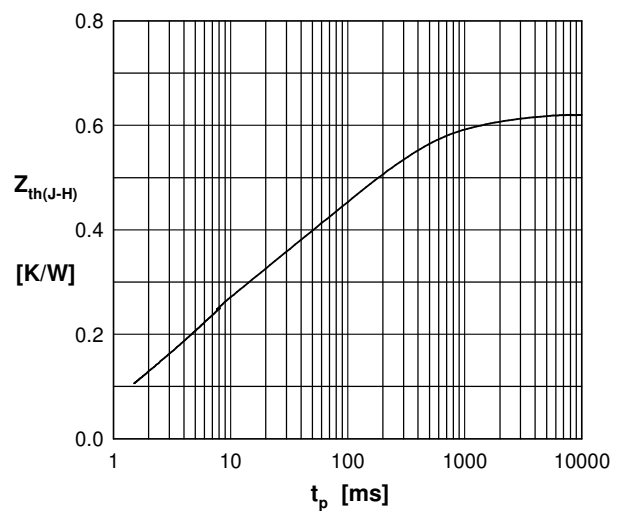


Fig. 18 Typical transient thermal impedance