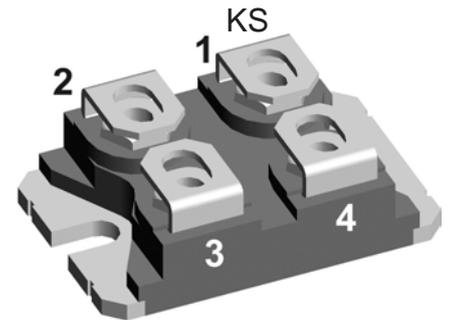
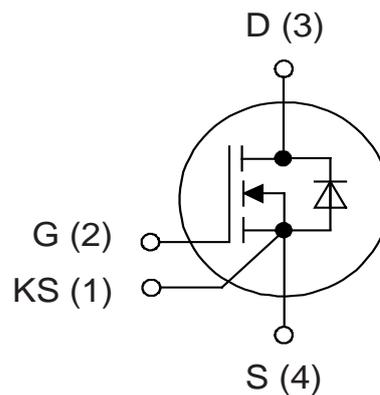


# SiC Power MOSFET

preliminary

 $I_{D25} = 68 \text{ A}$   
 $V_{DSS} = 1200 \text{ V}$   
 $R_{DS(on) \text{ max}} = 34 \text{ m}\Omega$ 

Kelvin Source gate connection

**Part number**  
 IXFN70N120SK

 Backside: isolated  
 UL pending

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

- Isolation Voltage: 3000 V~
- Industry standard outline
- RoHS compliant
- Epoxy meets UL 94V-0
- Base plate with Aluminium nitride isolation
- Advanced power cycling

**Terms & Conditions of usage**

The data contained in this product data sheet is exclusively intended for technically trained staff. The user will have to evaluate the suitability of the product for the intended application and the completeness of the product data with respect to his application. The specifications of our components may not be considered as an assurance of component characteristics. The information in the valid application- and assembly notes must be considered. Should you require product information in excess of the data given in this product data sheet or which concerns the specific application of your product, please contact your local sales office.

Due to technical requirements our product may contain dangerous substances. For information on the types in question please contact your local sales office.

Should you intend to use the product in aviation, in health or life endangering or life support applications, please notify. For any such application we urgently recommend

- to perform joint risk and quality assessments;

- the conclusion of quality agreements;

- to establish joint measures of an ongoing product survey, and that we may make delivery dependent on the realization of any such measures.

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

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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
$V_{GS}$	continuous gate source voltage	recommended operational value	-5		+20		V
$I_{D25}$	drain current	$V_{GS} = 20\text{ V}$			68		A
$I_{D80}$					55		A
$I_{D100}$					48		A
$R_{DSon}$	static drain source on resistance	$I_D = 50\text{ A}$ ; $V_{GS} = 20\text{ V}$		25	34		mΩ
				52			mΩ
$V_{GS(th)}$	gate threshold voltage	$I_D = 15\text{ mA}$ ; $V_{GS} = V_{DS}$	2.0	2.6	4.0		V
				2.1			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	$V_{DS} = 0\text{ V}$ ; $V_{GS} = 20\text{ V}$			0.6		μA
$R_G$	internal gate resistance	$f = 1\text{ MHz}$ , $V_{AC} = 25\text{ mV}$ , ESR of $C_{ISS}$		1.1			Ω
$C_{ISS}$	input capacitance			2790			pF
$C_{OSS}$	output capacitance	$V_{DS} = 1000\text{ V}$ ; $V_{GS} = 0\text{ V}$ ; $f = 1\text{ MHz}$		220			pF
$C_{RSS}$	reverse transfer (Miller) capacitance	$T_{VJ} = 25^\circ\text{C}$		15			pF
$Q_g$	total gate charge			161			nC
$Q_{gs}$	gate source charge	$V_{DS} = 800\text{ V}$ ; $I_D = 50\text{ A}$ ; $V_{GS} = -5/20\text{ V}$		46			nC
$Q_{gd}$	gate drain (Miller) charge	$T_{VJ} = 25^\circ\text{C}$		50			nC
$t_{d(on)}$	turn-on delay time			30			ns
$t_r$	current rise time	Inductive switching		15			ns
$t_{d(off)}$	turn-off delay time	$V_{DS} = 800\text{ V}$ ; $I_D = 50\text{ A}$		82			ns
$t_f$	current fall time	$T_{VJ} = 25^\circ\text{C}$		27			ns
$E_{on}$	turn-on energy per pulse	$V_{GS} = -5 / 20\text{ V}$ ; $R_G = 15\ \Omega$ (external)		1.35			mJ
$E_{off}$	turn-off energy per pulse	Freewheeling diode is Mosfet's body diode		0.76			mJ
$E_{rec(off)}$	reverse recovery losses at turn-off			0.13			mJ
$t_{d(on)}$	turn-on delay time			28			ns
$t_r$	current rise time	Inductive switching		12			ns
$t_{d(off)}$	turn-off delay time	$V_{DS} = 800\text{ V}$ ; $I_D = 50\text{ A}$		125			ns
$t_f$	current fall time	$T_{VJ} = 150^\circ\text{C}$		28			ns
$E_{on}$	turn-on energy per pulse	$V_{GS} = -5 / 20\text{ V}$ ; $R_G = 15\ \Omega$ (external)		1.71			mJ
$E_{off}$	turn-off energy per pulse	Freewheeling diode is Mosfet's body diode		0.78			mJ
$E_{rec(off)}$	reverse recovery losses at turn-off			0.29			mJ
$R_{thJC}$	thermal resistance junction to case				0.45		K/W
$R_{thJH}$	thermal resistance junction to heatsink	with heatsink compound; IXYS test setup		0.6			K/W

Source-Drain Diode				Ratings			
Symbol	Definitions	Conditions	min.	typ.	max.		
$V_{SD}$	forward voltage drop	$I_F = 50\text{ A}$ ; $V_{GS} = -5\text{ V}$		4.3			V
				3.7			V
$t_{rr}$	reverse recovery time	$V_{GS} = -5\text{ V}$ ; $I_F = 50\text{ A}$ ; $V_R = 800\text{ V}$		35			ns
$Q_{RM}$	reverse recovery charge (intrinsic diode)	Mosfet gate drive:		0.52			μC
$I_{RM}$	max. reverse recovery current	$V_{GS} = -5 / 20\text{ V}$ ; $R_G = 15\ \Omega$		33			A
$dI_F/dt$	current slew rate			3380			A/μs
$t_{rr}$	reverse recovery time	$V_{GS} = -5\text{ V}$ ; $I_F = 50\text{ A}$ ; $V_R = 800\text{ V}$		30			ns
$Q_{RM}$	reverse recovery charge (intrinsic diode)	Mosfet gate drive:		1.23			μC
$I_{RM}$	max. reverse recovery current	$V_{GS} = -5 / 20\text{ V}$ ; $R_G = 15\ \Omega$		59			A
$dI_F/dt$	current slew rate			4250			A/μs

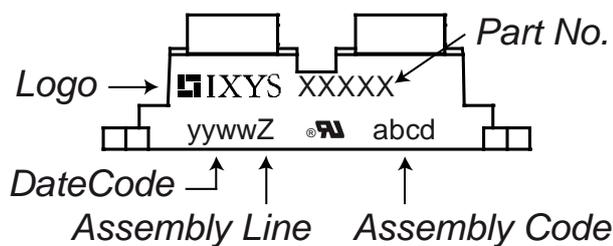
**Note:**

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

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

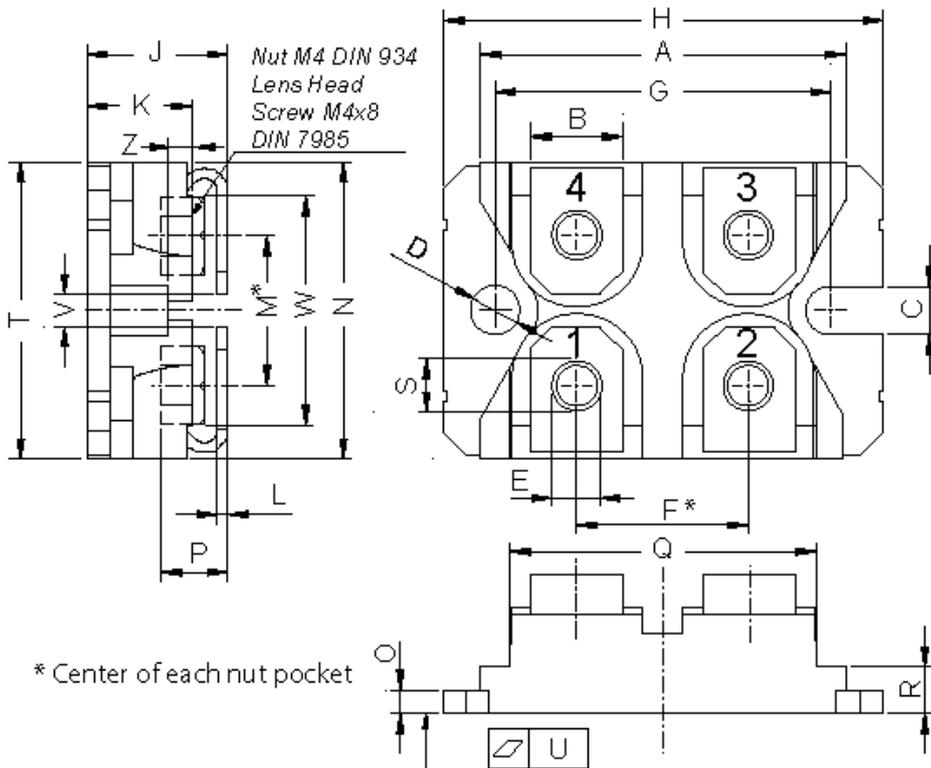
Symbol	Definitions	Conditions	Ratings			Unit
			min.	typ.	max.	
$I_{RMS}$	RMS current	per terminal				A
$T_{stg}$	storage temperature		-40		150	°C
$T_{op}$	operation temperature		-40		150	°C
$T_{vJ}$	virtual junction temperature		-40		175	°C
<b>Weight</b>				30		g
$M_D$	mounting torque		1.1		1.5	Nm
$M_T$	terminal torque		1.1		1.5	Nm
$d_{Spp/App}$	creepage distance on surface   striking distance through air	terminal to backside	10.5 / 3.2			mm
$d_{Spb/Appb}$		terminal to terminal	8.6 / 6.8			mm
$V_{ISOL}$	isolation voltage	$I_{ISOL} \leq 1 \text{ mA}; 50/60 \text{ Hz},$				V
		$t = 1 \text{ sec.}$	3000			V
		$t = 1 \text{ minute}$	2500			V

### Product Marking

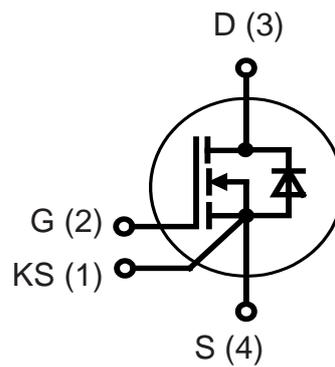


Ordering	Part Name	Marking on Product	Delivering Mode	Base Qty	Ordering Code
Standard	IXFN70N120SK	IXFN70N120SK	Tube	10	517981

## 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

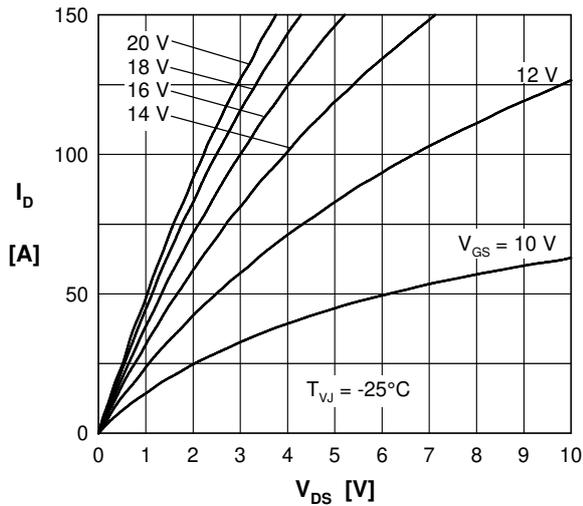


Fig. 1 Typical output characteristics (-25°C)

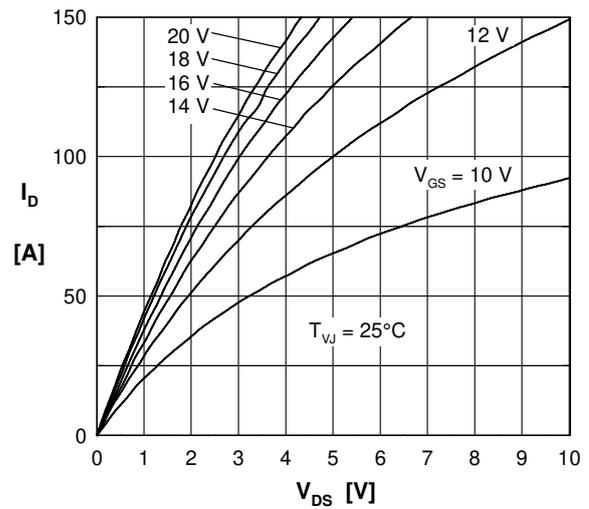


Fig. 2 Typical output characteristics (25°C)

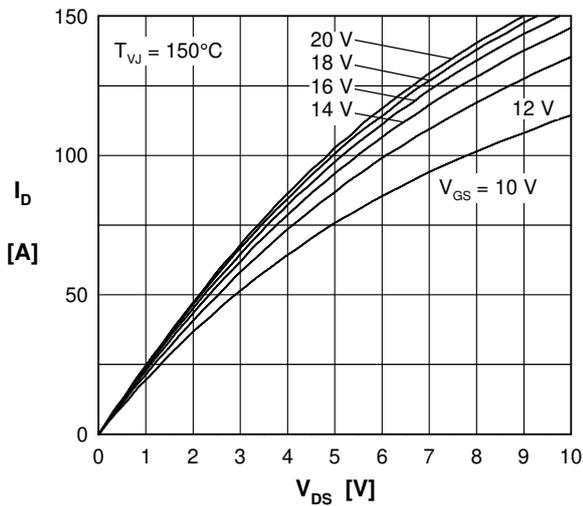


Fig. 3 Typical output characteristics (150°C)

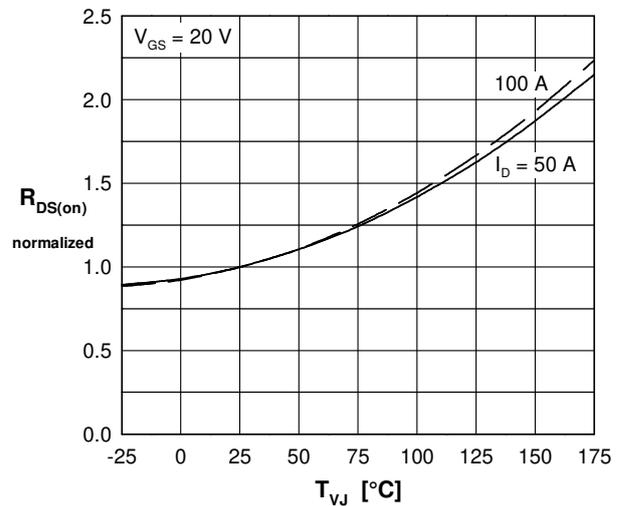


Fig. 4  $R_{DS(on)}$  normalized vs. junction temperature  $T_{VJ}$

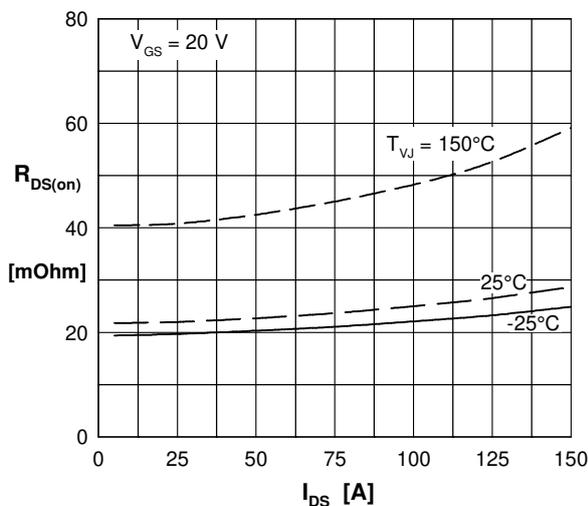


Fig. 5  $R_{DS(on)}$  versus drain current

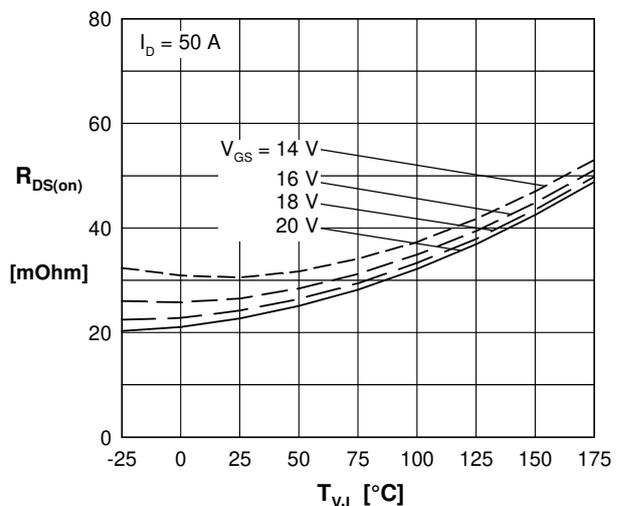


Fig. 6  $R_{DS(on)}$  versus junction temperature  $T_{VJ}$

## Curves

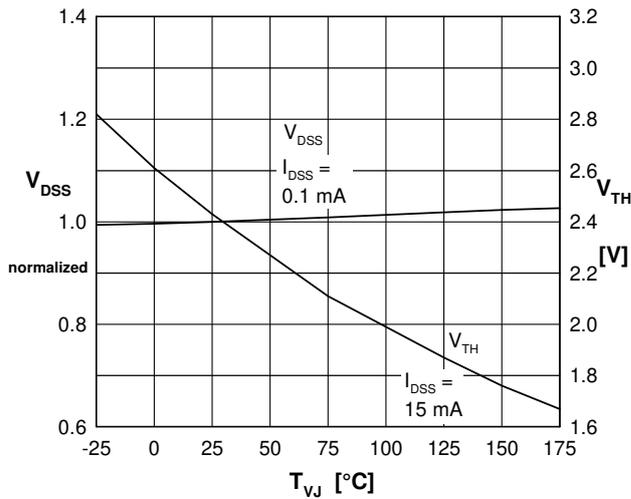


Fig. 7 Norm. breakdow  $V_{DSS}$  & treshhold voltage  $V_{TH}$  versus junction temperature  $T_{VJ}$

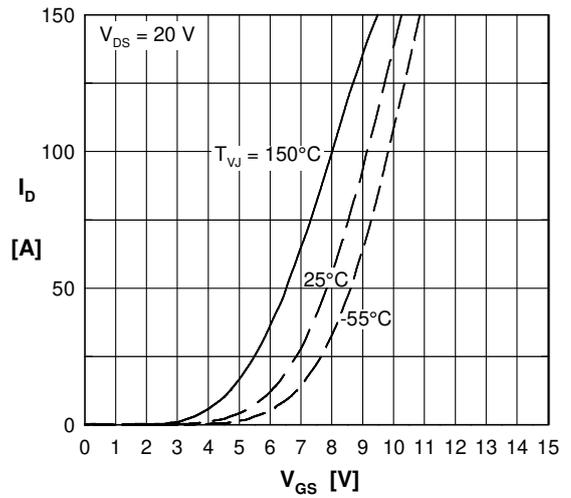


Fig. 8 Typical transfer characteristics

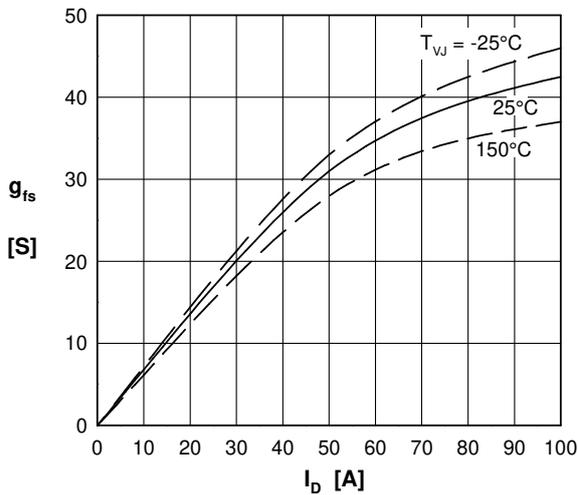


Fig. 9 Typical forward transconductance

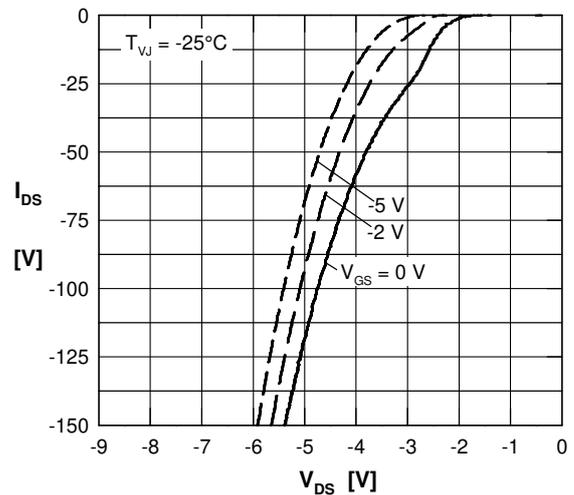


Fig. 10 Forward voltage drop of intrinsic diode versus  $V_{DS}$  measured at  $-55^{\circ}\text{C}$

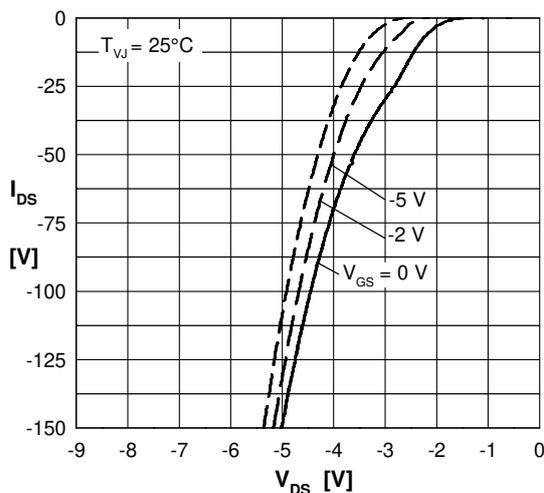


Fig. 11 Forward voltage drop of intrinsic diode versus  $V_{DS}$  measured at  $25^{\circ}\text{C}$

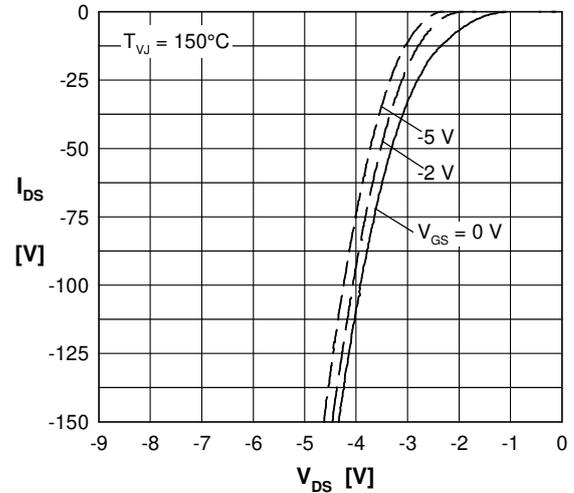


Fig. 12 Forward voltage drop of intrinsic diode versus  $V_{DS}$  measured at  $150^{\circ}\text{C}$

Curves

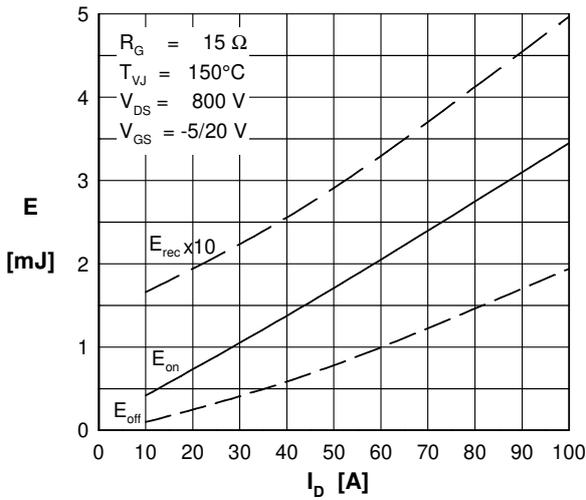


Fig. 13 Typical switching energy versus drain current

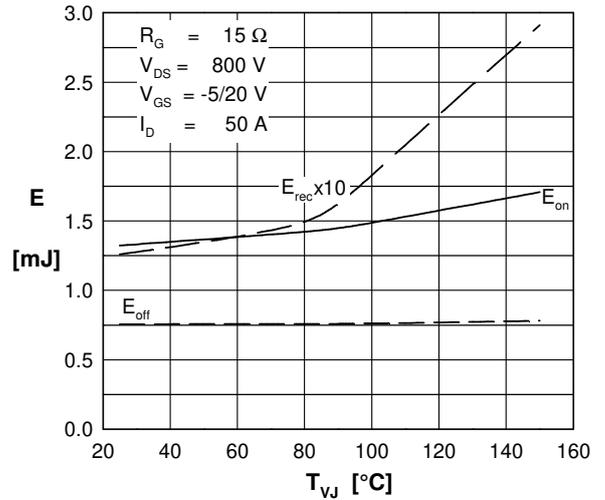


Fig. 14 Typical switching energy versus temperature

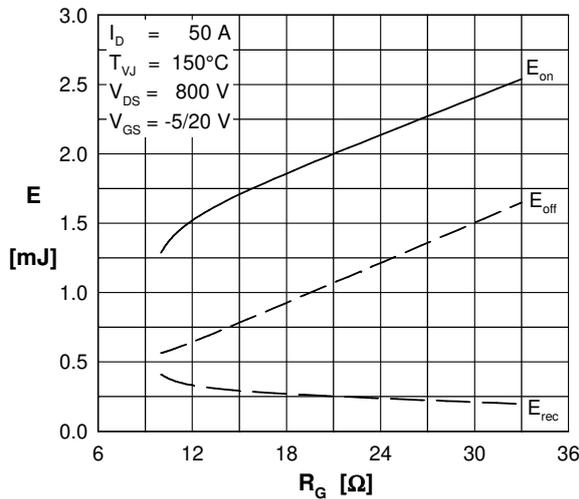


Fig. 15 Typical switching energy versus external gate resistor

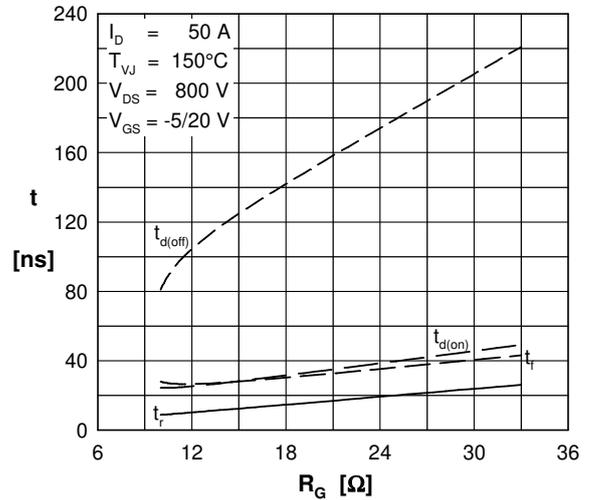


Fig. 16 Typical switching time versus external gate resistor

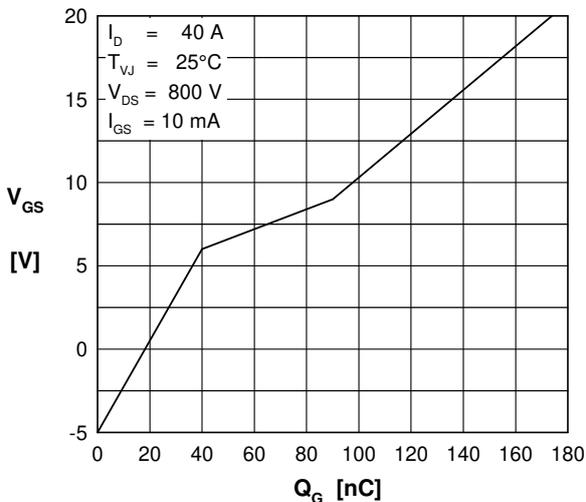


Fig. 17 Typical turn on gate charge, trendline

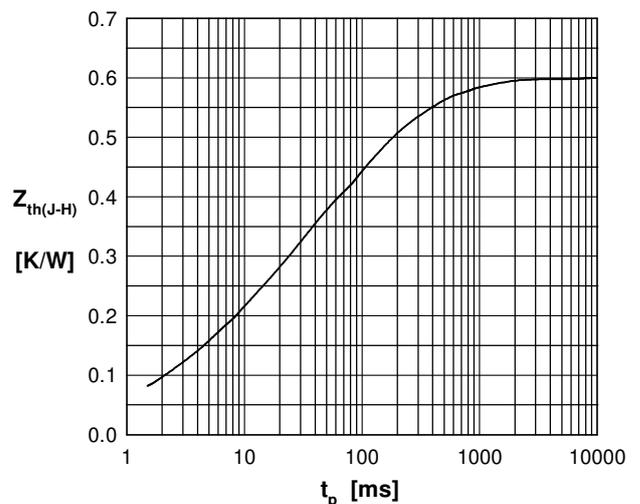


Fig. 18 Typical transient thermal impedance