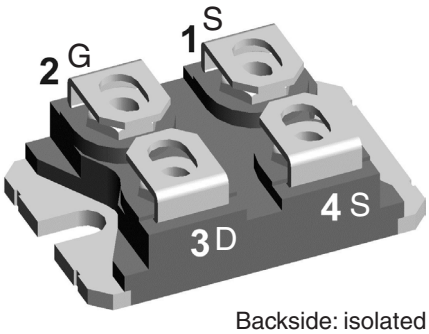
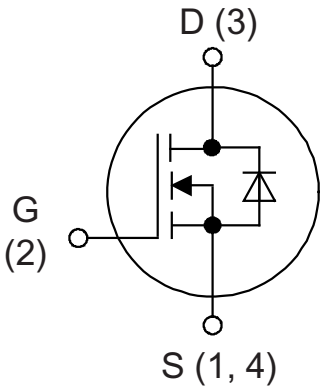
SiC Power MOSFET

I_{D25} = 47 A
V_{DSS} = 1200 V
$R_{DS(on)\ max}$ = 50 mΩ

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

Information furnished is believed to be accurate and reliable. However, users should independently evaluate the suitability of and test each product selected for their own applications. Littelfuse products are not designed for, and may not be used in, all applications. Read complete Disclaimer Notice Disclaimer Notice at www.littelfuse.com/disclaimer-electronics.

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

© 2022 IXYS All rights reserved

MOSFET

Symbol	Definitions	Conditions	Ratings min.	typ.	max.	
V_{DSS}	*drain source breakdown voltage*	V_{GS} = 0 V, I_D = 200 µA	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 V, T_C = 25°C			47	A
I_{D80}		V_{GS} = 20 V, T_C = 80°C			35	A
I_{D100}		V_{GS} = 20 V, T_C = 100°C			30	A
$I_{D(pulse)}$	*pulsed drain current*	pulse width limited by $T_{VJ\,max}$			125	A
P_D	*power dissipation*	T_C = 25°C, T_{VJ} = 175°C			270	W
R_{DSon}	*static drain source on resistance*	I_D = 40 A; V_{GS} = 20 V, T_{VJ} = 25°C		40	50	mΩ
		I_D = 40 A; V_{GS} = 20 V, T_{VJ} = 150°C		75		mΩ
$V_{GS(th)}$	*gate threshold voltage*	I_D = 10 mA; V_{GS} = V_{DS}, T_{VJ} = 25°C	2.0	2.6	4.0	V
		I_D = 10 mA; V_{GS} = V_{DS}, T_{VJ} = 150°C		2.1		V
I_{DSS}	*drain source leakage current*	V_{DS} = 1200 V; V_{GS} = 0 V, T_{VJ} = 25°C		2	200	µA
		V_{DS} = 1200 V; V_{GS} = 0 V, T_{VJ} = 150°C		20		µA
I_{GSS}	*gate source leakage current*	V_{DS} = 0 V; V_{GS} = 20 V, T_{VJ} = 25°C			0.5	µA
R_G	*internal gate resistance*				4.8	Ω
C_{iss}	*input capacitance*	V_{DS} = 1000 V; V_{GS} = 0 V; f = 1 MHz, T_{VJ} = 25°C		1900		pF
C_{oss}	*output capacitance*			160		pF
C_{rss}	*reverse transfer (Miller) capacitance*			13		pF
Q_g	*total gate charge*	V_{DS} = 800 V; I_D = 40 A; V_{GS} = 0/20 V, T_{VJ} = 25°C		100		nC
Q_{gs}	*gate source charge*			22		nC
Q_{gd}	*gate drain (Miller) charge*			36		nC
$t_{d(on)}$	*turn-on delay time*	Inductive switching		23		ns
t_r	*current rise time*	V_{DS} = 800 V; I_D = 40 A		9		ns
$t_{d(off)}$	*turn-off delay time*	V_{GS} = -5 / 20 V; R_G = 10 Ω (external)		75		ns
t_f	*current fall time*	Freewheeling diode is Mosfet's body diode		19		ns
E_{on}	*turn-on energy per pulse*	T_{VJ} = 25°C		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		23		ns
t_r	*current rise time*	V_{DS} = 800 V; I_D = 40 A		9		ns
$t_{d(off)}$	*turn-off delay time*	V_{GS} = -5 / 20 V; R_G = 10 Ω (external)		100		ns
t_f	*current fall time*	Freewheeling diode is Mosfet's body diode		22		ns
E_{on}	*turn-on energy per pulse*	T_{VJ} = 150°C		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

Symbol	Definitions	Conditions	Ratings min.	typ.	max.	
V_{SD}	*forward voltage drop*	I_F = 40 A; V_{GS} = -5 V, T_{VJ} = 25°C		5.2		V
		I_F = 40 A; V_{GS} = -5 V, T_{VJ} = 150°C		4.6		V
t_{rr}	*reverse recovery time*	V_{GS} = -5 V; I_F = 40 A; V_R = 800 V, T_{VJ} = 25°C		16		ns
Q_{RM}	*reverse recovery charge (intrinsic diode)*	Mosfet gate drive:		330		nC
I_{RM}	*max. reverse recovery current*	V_{GS} = -5 / 20 V; R_G = 10 Ω		35		A
dI_F/dt	*current slew rate*			4800		A/µs
t_{rr}	*reverse recovery time*	V_{GS} = -5 V; I_F = 40 A; V_R = 800 V, T_{VJ} = 150°C		26		ns
Q_{RM}	*reverse recovery charge (intrinsic diode)*	Mosfet gate drive:		810		nC
I_{RM}	*max. reverse recovery current*	V_{GS} = -5 / 20 V; R_G = 10 Ω		45		A
dI_F/dt	*current slew rate*			4600		A/µs

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

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

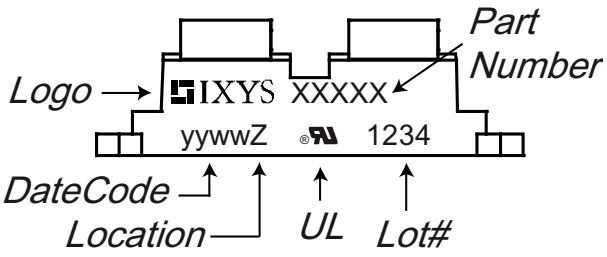
20221013e

© 2022 IXYS All rights reserved

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
Weight					30		g
M_D	*mounting torque* [1]	screws to heatsink terminal connection screws				1.5 1.3	Nm Nm
d_{Spp} d_{Spb}	*creepage distance on surface*	terminal to terminal terminal to backside		10.5 8.5			mm mm
d_{App} d_{Apb}	*striking distance through air*	terminal to terminal terminal to backside		3.2 6.8			mm mm
V_{ISOL}	*isolation voltage*	$I_{ISOL} \leq 1$ mA; 50/60 Hz	t = 1 sec. t = 1 minute	3000 2500			V V
C_P	*coupling capacity per switch*	between drain and back side metallization with gate and source shorted			42		pF

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

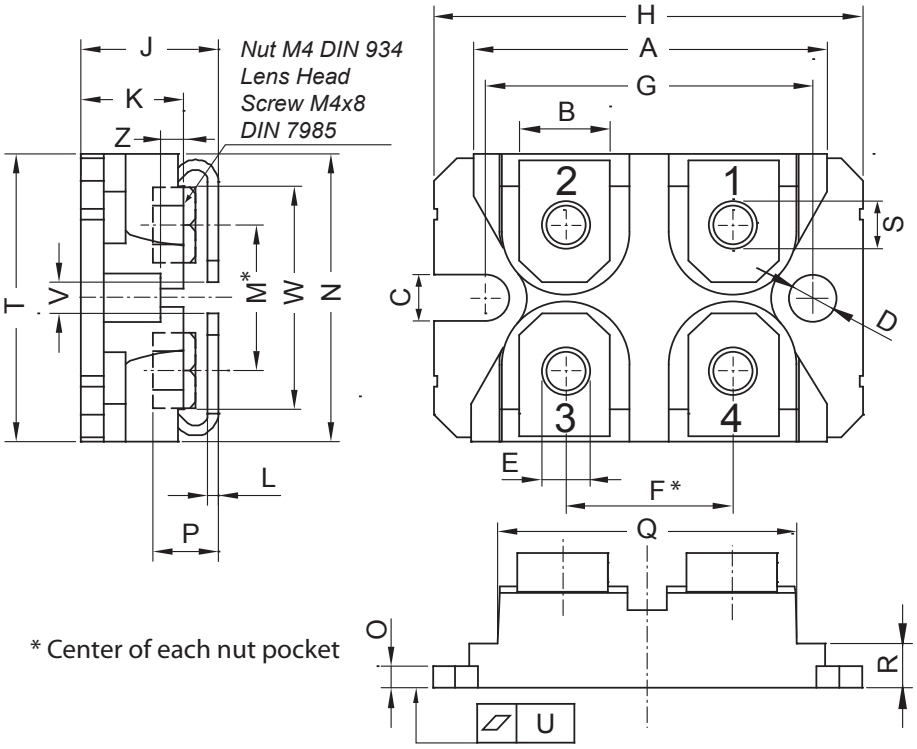
Product Marking



Ordering	Part Name	Marking on Product	Delivering Mode	Base Qty	Ordering Code
Standard	IXFN50N120SiC	IXFN50N120SiC	Tube	10	IXFN50N120SIC

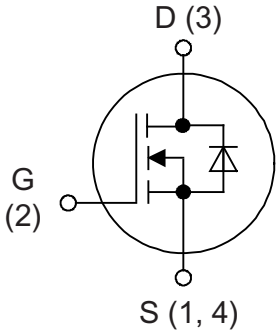
© 2022 IXYS All rights reserved

Outlines SOT-227B (minibloc)



* Center of each nut pocket

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



© 2022 IXYS All rights reserved

Curves

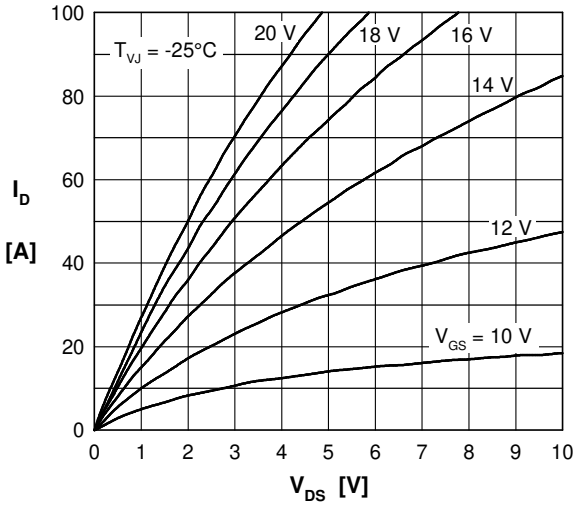


Fig. 1 Typical output characteristics (-25°C)

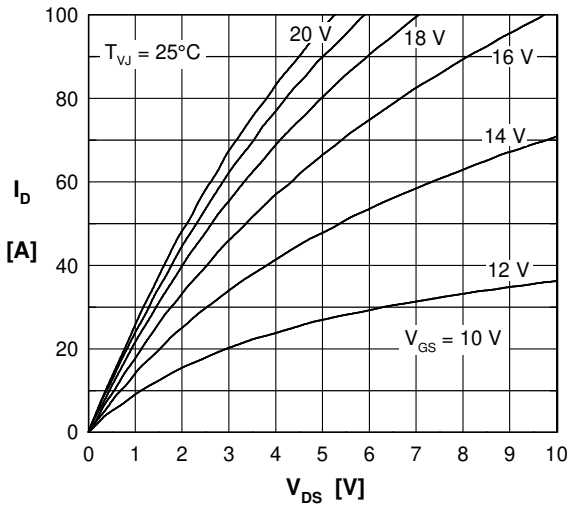


Fig. 2 Typical output characteristics (25°C)

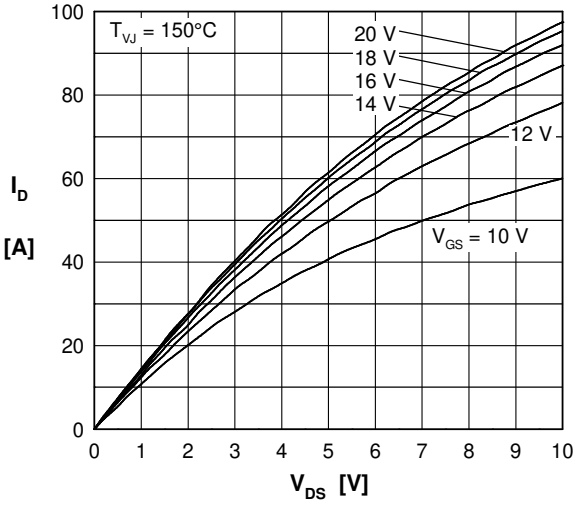


Fig. 3 Typical output characteristics (150°C)

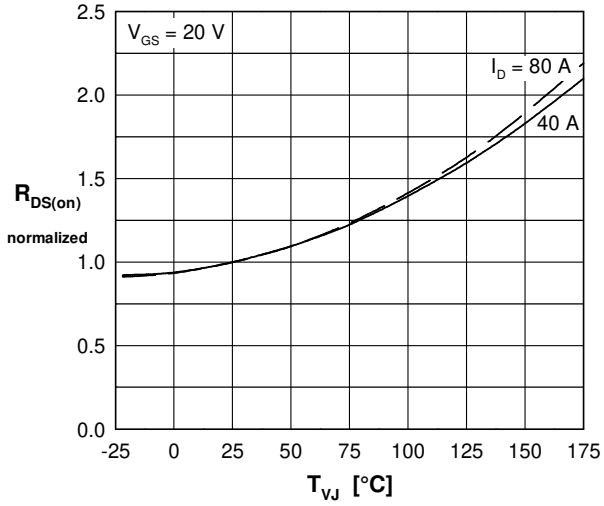


Fig. 4 $R_{DS(on)}$ normalized vs. junction temperature T_{VJ}

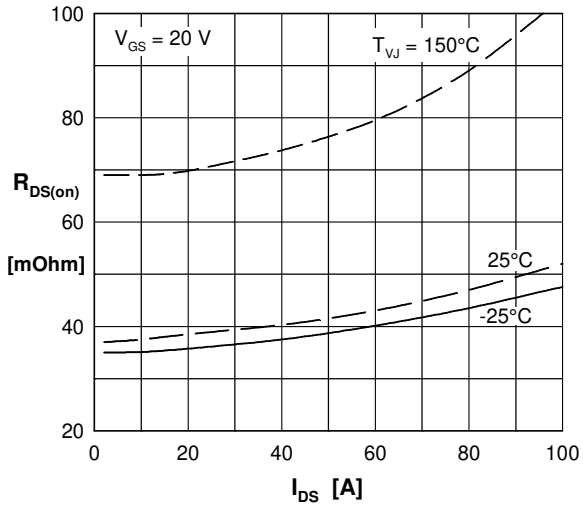


Fig. 5 $R_{DS(on)}$ versus drain current

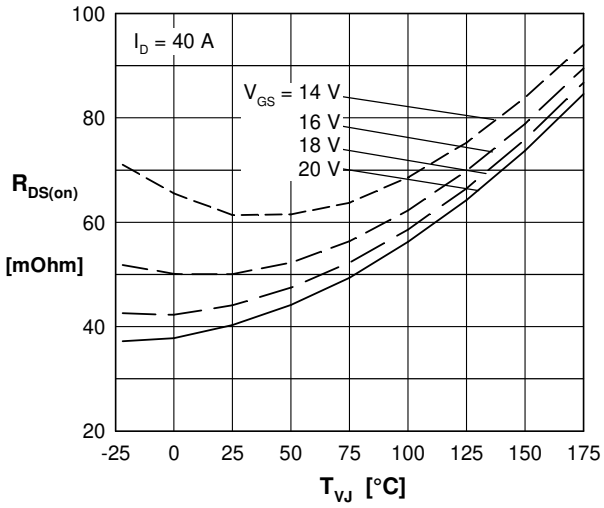


Fig. 6 $R_{DS(on)}$ versus junction temperature T_{VJ}

© 2022 IXYS All rights reserved

Curves

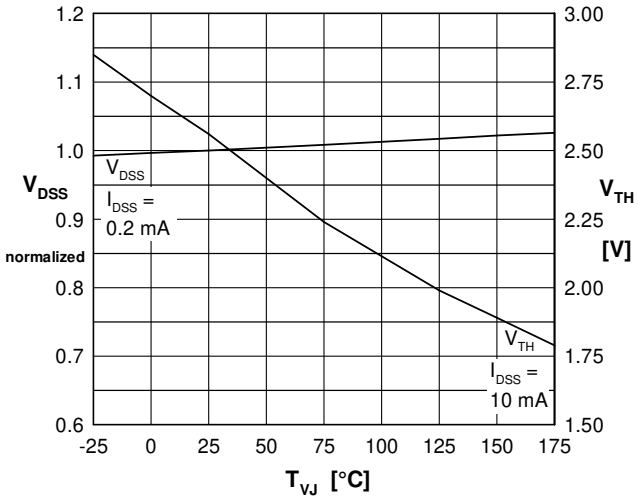


Fig. 7 Norm. breakdow V_{DSS} & treshhold voltage V_{TH} versus junction temperature T_{VJ}

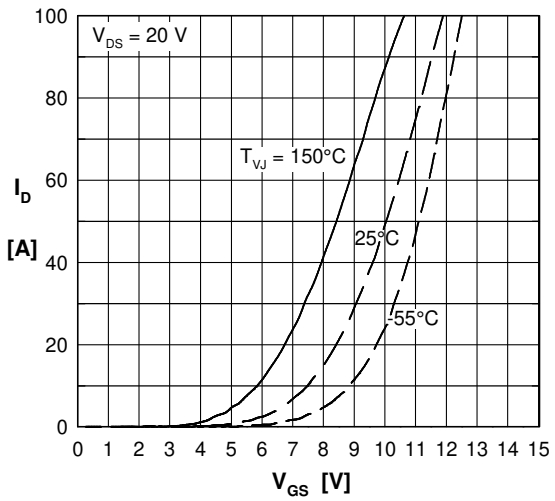


Fig. 8 Typical transfer characteristics

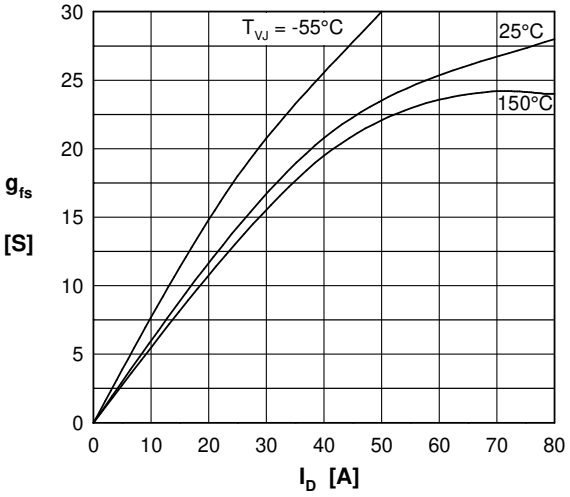


Fig. 9 Typical forward transconductance

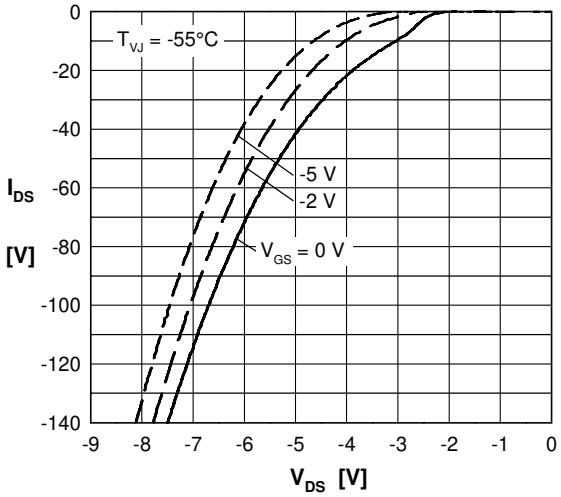


Fig. 10 Forward voltage drop of intrinsic diode versus V_{DS} measured at -55°C

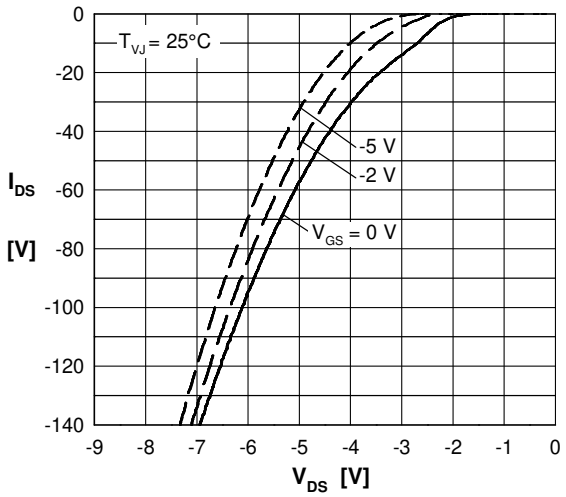


Fig. 11 Forward voltage drop of intrinsic diode versus V_{DS} measured at 25°C

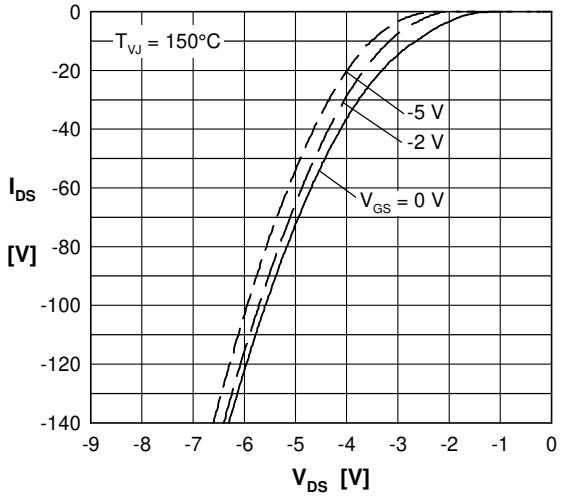


Fig. 12 Forward voltage drop of intrinsic diode versus V_{DS} measured at 150°C

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

© 2022 IXYS All rights reserved

Curves

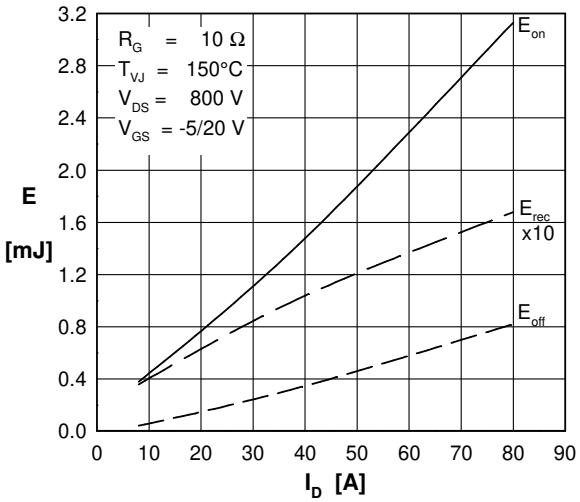


Fig. 13 Typical switching energy versus drain current

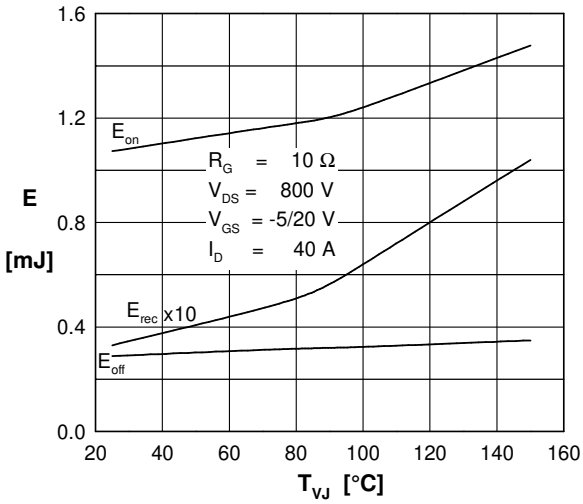


Fig. 14 Typical switching energy versus temperature

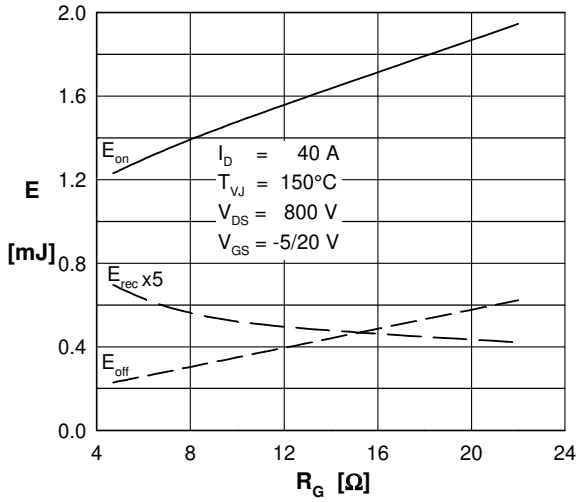


Fig. 15 Typical switching energy versus external gate resistor

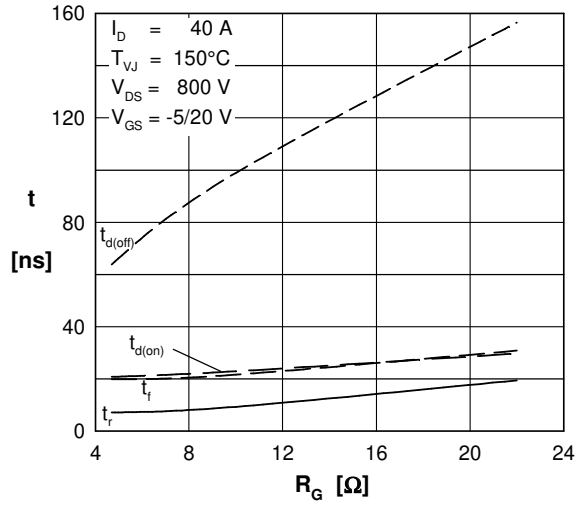


Fig. 16 Typical switching time versus external gate resistor

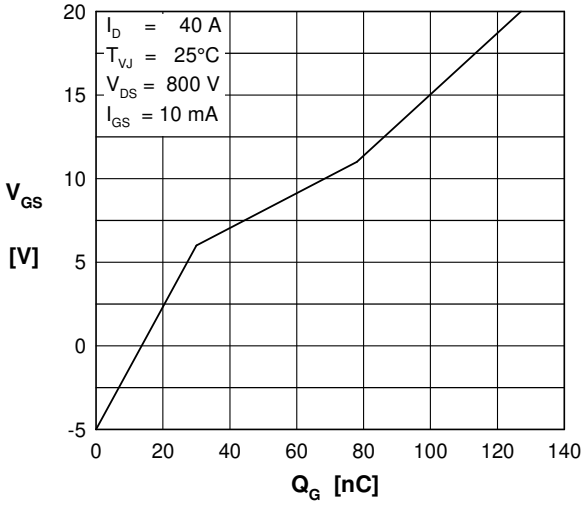


Fig. 17 Typical turn on gate charge, trendline

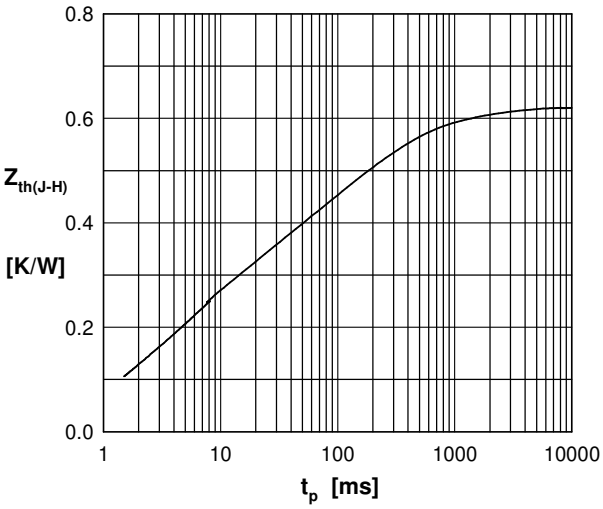


Fig. 18 Typical transient thermal impedance

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

© 2022 IXYS All rights reserved