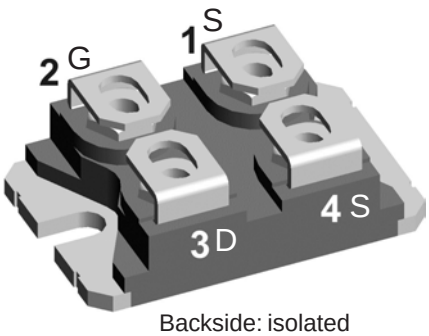
preliminary

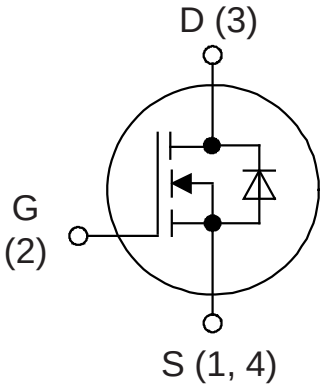
SiC Power MOSFET

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

Part number
IXFN50N120SiC



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
- 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: 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.

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preliminary

MOSFET				Ratings			
Symbol	**Definitions**	**Conditions**		**min.**	**typ.**	**max.**	
V_{DSS}	*drain source breakdown voltage*	V_{GS} = 0 V, I_D = 200µA		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}			T_C = 80°C			35	A
I_{D100}			T_C = 100°C			30	A
R_{DSon}	*static drain source on resistance*	I_D = 40 A; V_{GS} = 20 V	T_{VJ} = 25°C		40	50	mΩ
			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
			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
			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 V_{DS} = 800 V; I_D = 40 A V_{GS} = -5 / 20 V; R_G = 10 Ω (external) Freewheeling diode is Mosfet's body diode	T_{VJ} = 25°C		23		ns
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 V; I_D = 40 A V_{GS} = -5 / 20 V; R_G = 10 Ω (external) Freewheeling diode is Mosfet's body diode	T_{VJ} = 150°C		23		ns
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 A; V_{GS} = -5 V	T_{VJ} = 25°C		5.2		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 Mosfet gate drive: V_{GS} = -5 / 20 V; R_G = 10 Ω	T_{VJ} = 25°C		16		ns
Q_{RM}	*reverse recovery charge (intrinsic diode)*				330		nC
I_{RM}	*max. reverse recovery current*				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 Mosfet gate drive: V_{GS} = -5 / 20 V; R_G = 10 Ω	T_{VJ} = 150°C		26		ns
Q_{RM}	*reverse recovery charge (intrinsic diode)*				810		nC
I_{RM}	*max. reverse recovery current*				45		A
dI_F/dt	*current slew rate*				4600		A/µs

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

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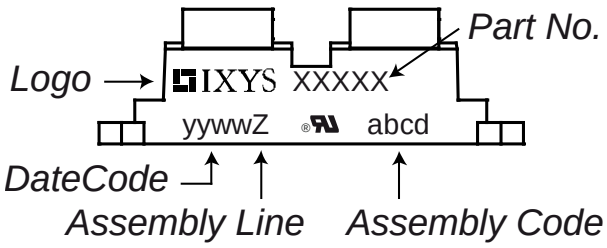
Package SOT-227B (minibloc)

Symbol	Definitions	Conditions		Ratings min.	typ.	max.	Unit
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
Weight					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
$d_{Spb/Apb}$			*terminal to terminal*	8.6 / 6.8			mm
V_{ISOL}	*isolation voltage*	$I_{ISOL} \leq$ 1 mA; 50/60 Hz,	t = 1 sec.	3000			V
			t = 1 minute	2500			V

Product Marking



Ordering	Part Name	Marking on Product	Delivering Mode	Base Qty	Ordering Code
Standard	IXFN50N120SiC	IXFN50N120SiC	Tube	10	515282

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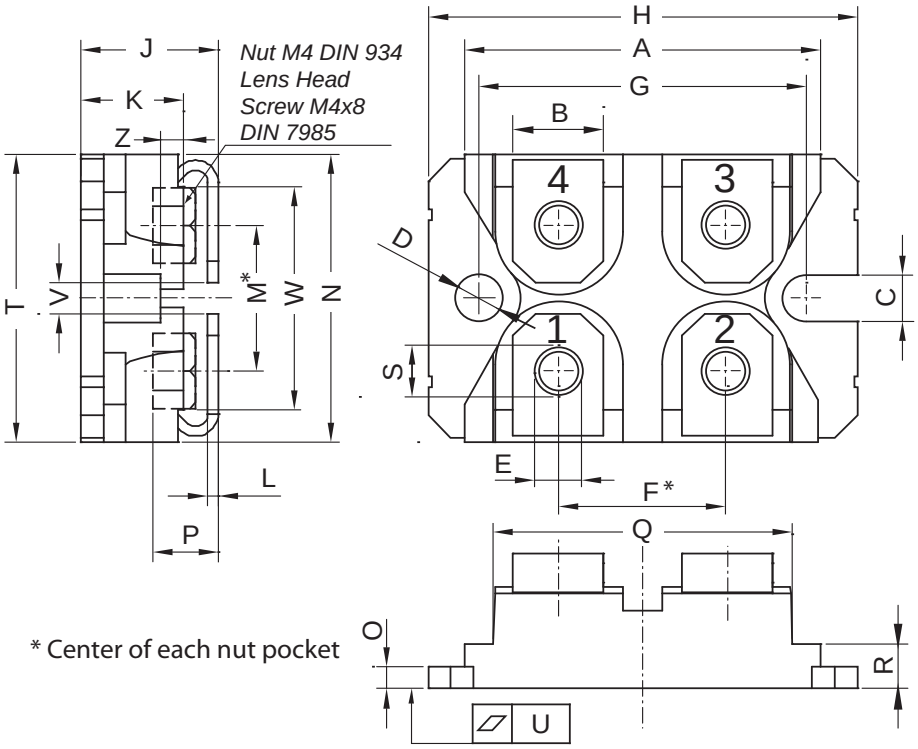
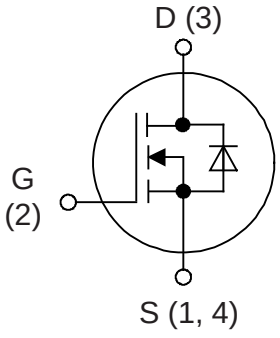
Outlines SOT-227B (minibloc)



* 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



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Curves

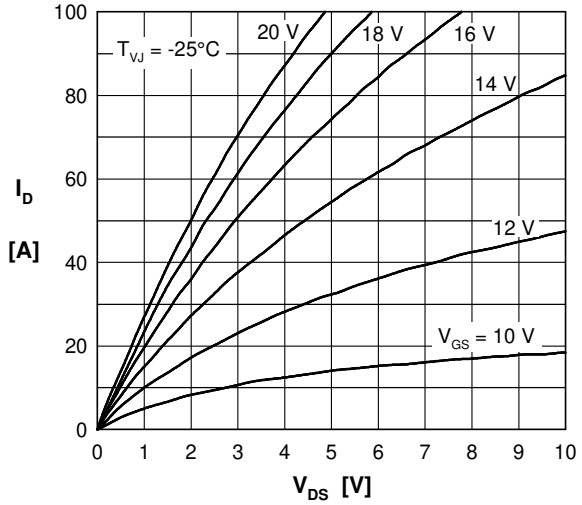

Fig. 1 Typical output characteristics (-25°C)

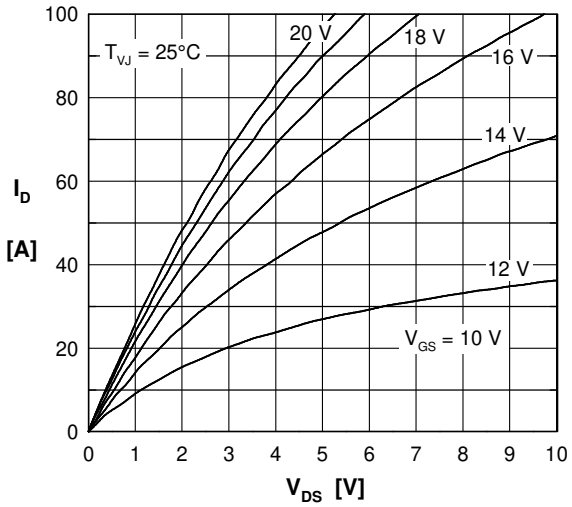

Fig. 2 Typical output characteristics (25°C)

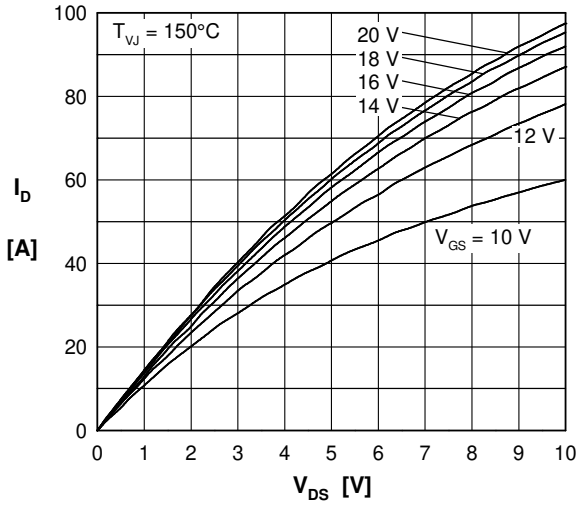

Fig. 3 Typical output characteristics (150°C)

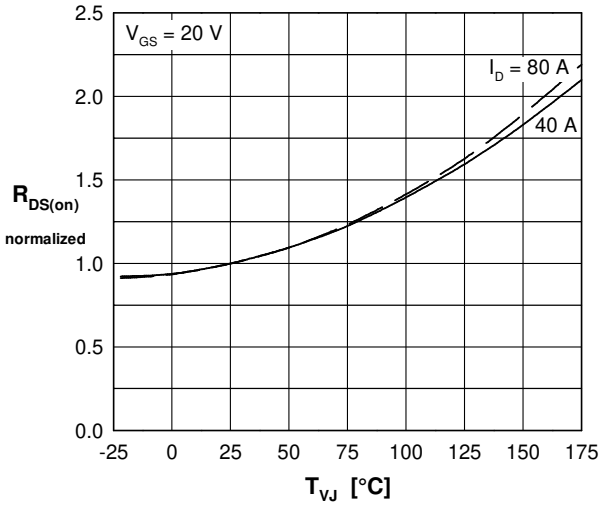

Fig. 4 $R_{DS(on)}$ normalized vs. junction temperature T_{VJ}

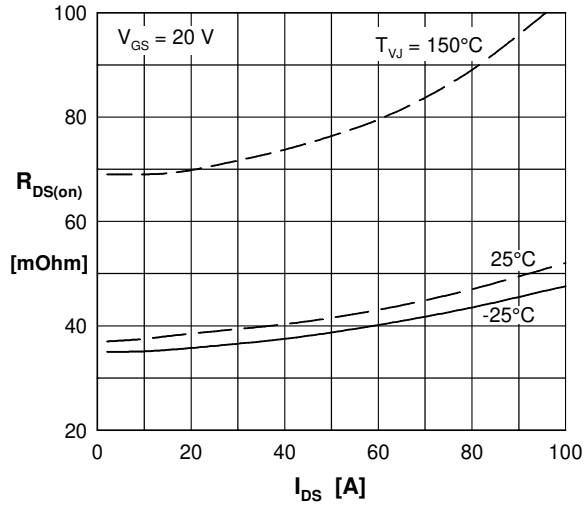

Fig. 5 $R_{DS(on)}$ versus drain current

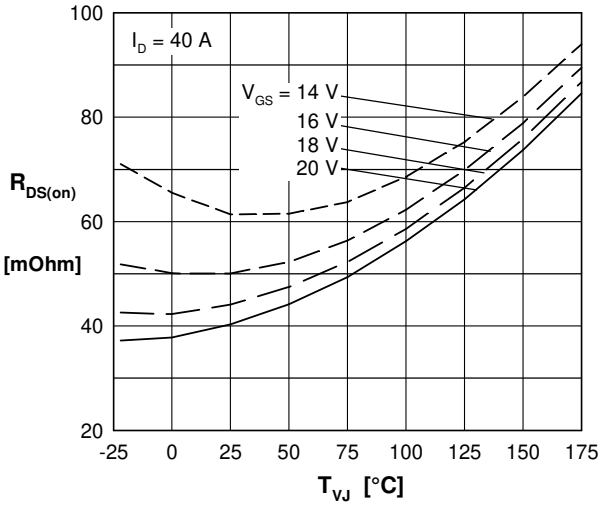

Fig. 6 $R_{DS(on)}$ versus junction temperature T_{VJ}

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Curves

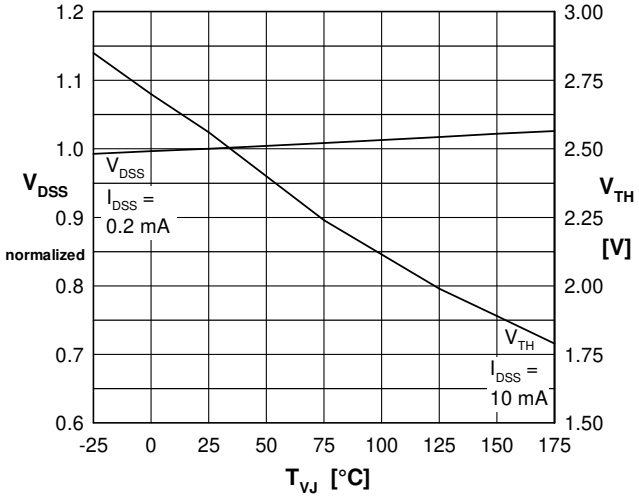

Fig. 7 Norm. breakdow V_{DSS} & treshhold voltage V_{TH} versus junction temperature T_{VJ}

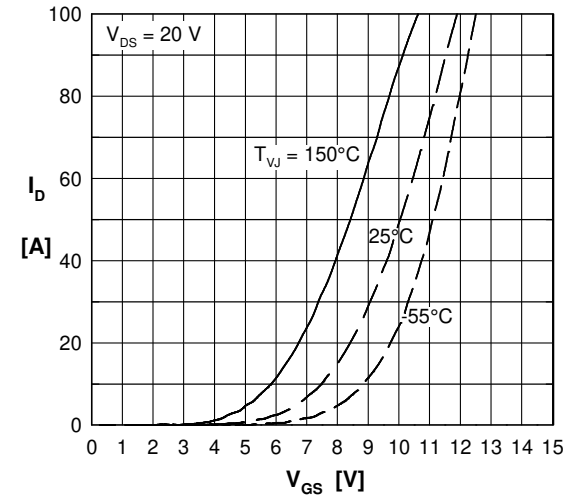

Fig. 8 Typical transfer characteristics

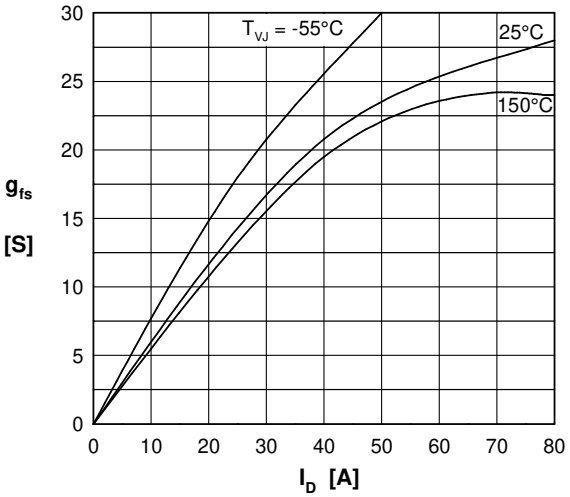

Fig. 9 Typical forward transconductance

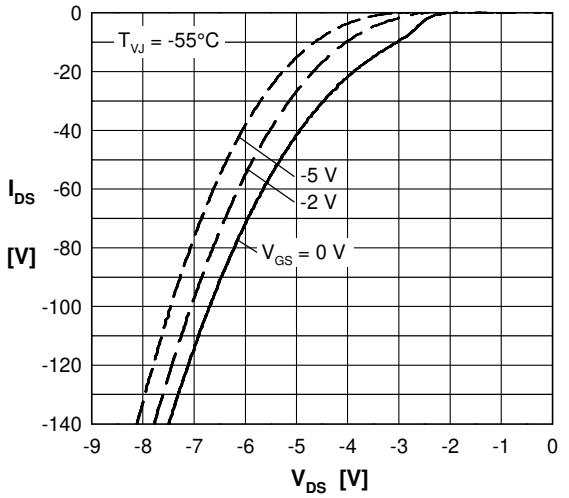

Fig. 10 Forward voltage drop of intrinsic diode versus V_{DS} measured at -55°C

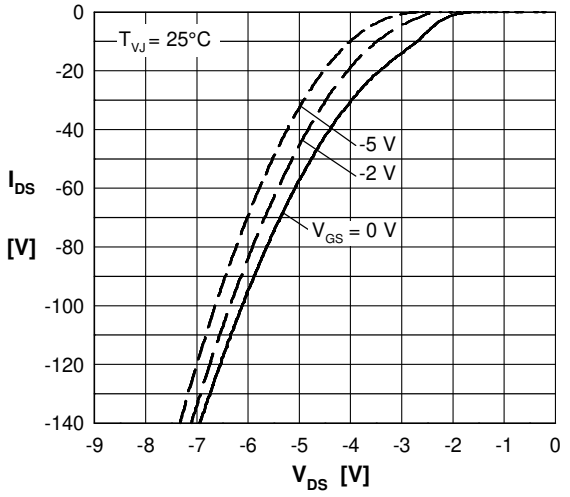

Fig. 11 Forward voltage drop of intrinsic diode versus V_{DS} measured at 25°C

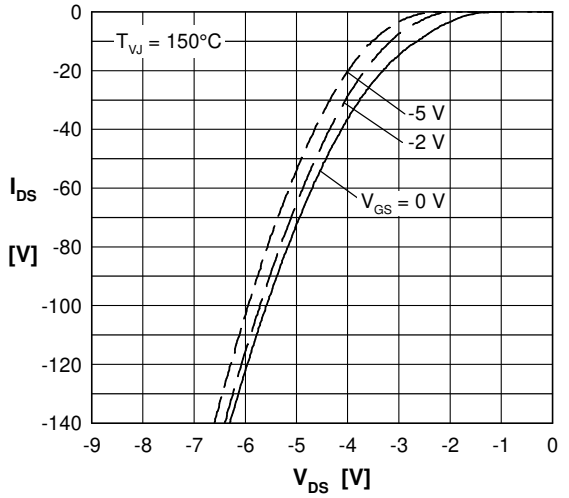

Fig. 12 Forward voltage drop of intrinsic diode versus V_{DS} measured at 150°C

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Curves

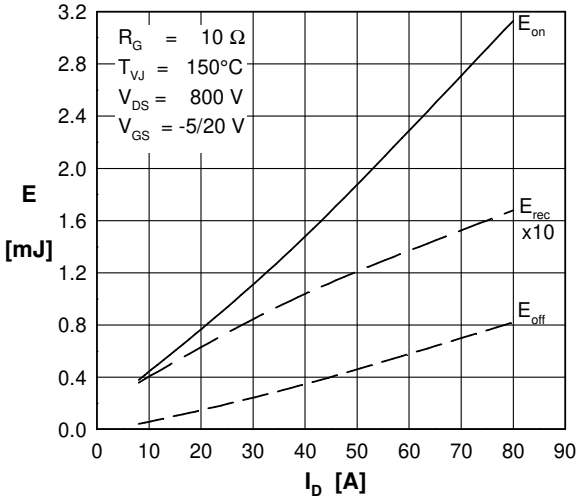

Fig. 13 Typical switching energy versus drain current

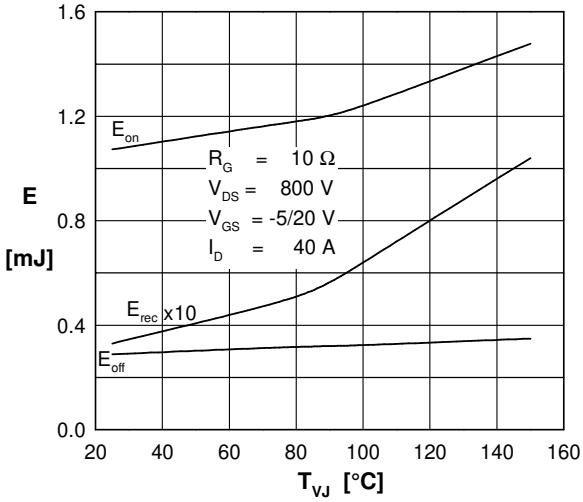

Fig. 14 Typical switching energy versus temperature

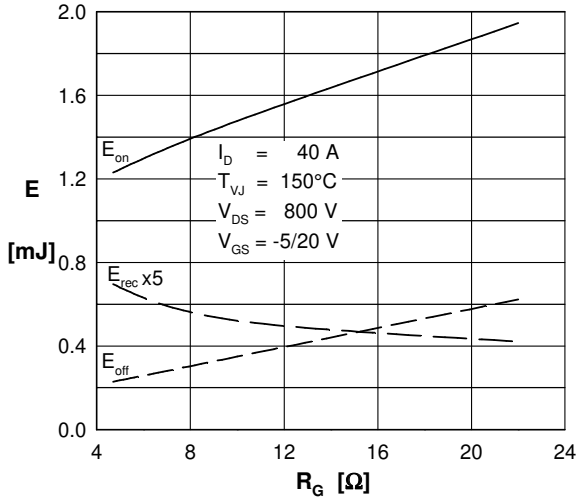

Fig. 15 Typical switching energy versus external gate resistor

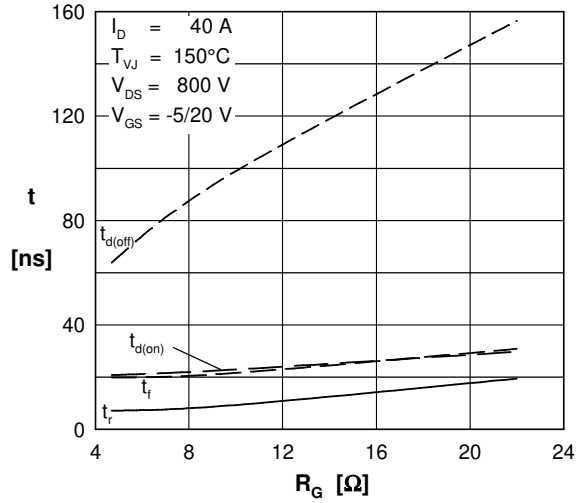

Fig. 16 Typical switching time versus external gate resistor

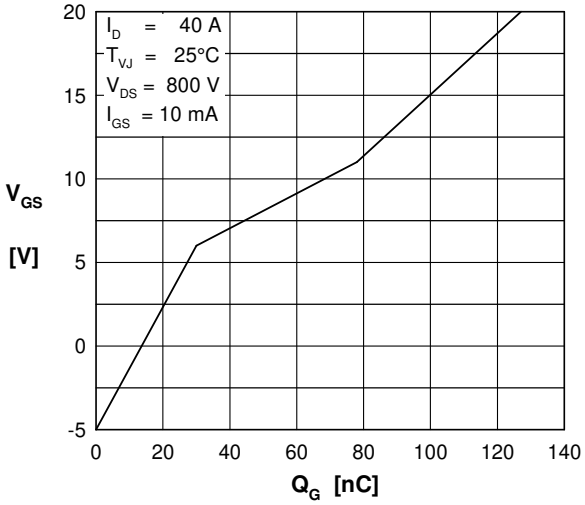

Fig. 17 Typical turn on gate charge, trendline

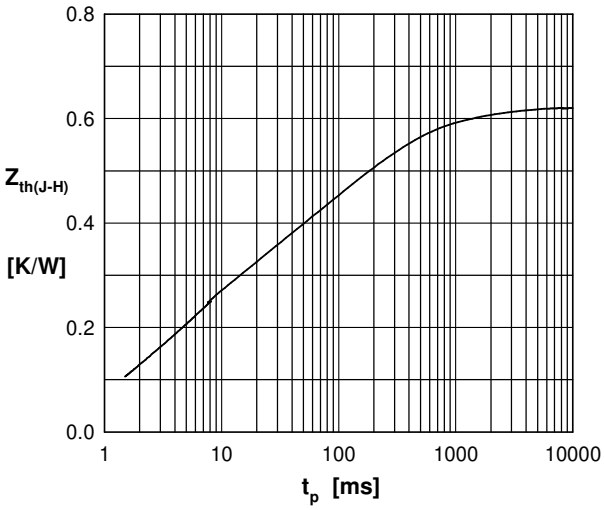

Fig. 18 Typical transient thermal impedance

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