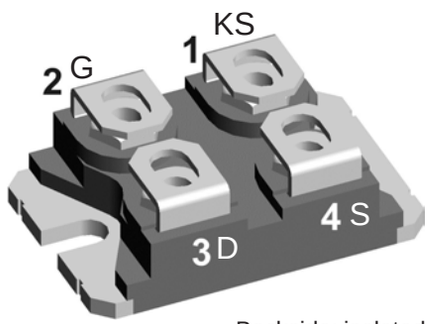
preliminary

SiC Power MOSFET

I_{D25} = 90 A
V_{DSS} = 1700 V
$R_{DS(on)\ max}$ = 35 mΩ

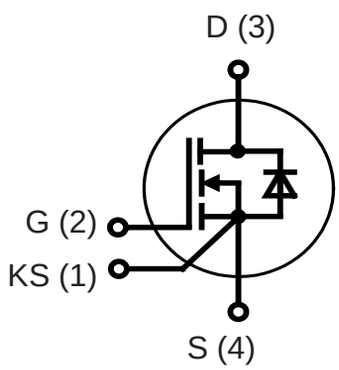
Kelvin Source gate connection

Part number
IXFN90N170SK



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.**	
$V_{(BR)DSS}$	*drain source breakdown voltage*	I_D = 200 µA	T_{VJ} = 25°C	1700			V
$V_{GS(max)}$	*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			90	A
I_{D80}			T_C = 80°C			67	A
I_{D100}			T_C = 100°C			56	A
R_{DSon}	*static drain source on resistance*	I_D = 100 A; V_{GS} = 20 V	T_{VJ} = 25°C		23	35	mΩ
			T_{VJ} = 150°C		45		mΩ
$V_{GS(th)}$	*gate threshold voltage*	I_D = 36 mA; V_{GS} = V_{DS}	T_{VJ} = 25°C	2.0	2.4	4.0	V
			T_{VJ} = 150°C		1.8		V
I_{DSS}	*drain source leakage current*	V_{DS} = 1700 V; V_{GS} = 0 V	T_{VJ} = 25°C		5	200	µA
I_{GSS}	*gate source leakage current*	V_{DS} = 0 V; V_{GS} = 20 V	T_{VJ} = 25°C			1.2	µA
R_G	*internal gate resistance*	f = 1 MHz, V_{AC} = 25 mV, ESR of C_{ISS}			1.9		Ω
C_{iss}	*input capacitance*	V_{DS} = 1000 V; V_{GS} = 0 V; f = 1 MHz	T_{VJ} = 25°C		7340		pF
C_{oss}	*output capacitance*				342		pF
C_{rss}	*reverse transfer (Miller) capacitance*				13.5		pF
Q_g	*total gate charge*	V_{DS} = 1200 V; I_D = 100A; V_{GS} = -5/20 V			376		nC
Q_{gs}	*gate source charge*	T_{VJ} = 25°C			88		nC
Q_{gd}	*gate drain (Miller) charge*				114		nC
$t_{d(on)}$	*turn-on delay time*	Inductive switching			34		ns
t_r	*current rise time*	V_{DS} = 1200 V; I_D = 70 A	T_{VJ} = 25°C		13		ns
$t_{d(off)}$	*turn-off delay time*	V_{GS} = -5 / 20 V; R_G = 2.5 Ω (external)			75		ns
t_f	*current fall time*	Free wheeling diode:			27		ns
E_{on}	*turn-on energy per pulse*	Body diode @ V_{GS} = -5 V			2.58		mJ
E_{off}	*turn-off energy per pulse*				0.77		mJ
$E_{rec(off)}$	*reverse recovery losses at turn-off*				0.66		mJ
$t_{d(on)}$	*turn-on delay time*	Inductive switching			36		ns
t_r	*current rise time*	V_{DS} = 1200 V; I_D = 70 A	T_{VJ} = 150°C		13		ns
$t_{d(off)}$	*turn-off delay time*	V_{GS} = -5 / 20 V; R_G = 2.5 Ω (external)			105		ns
t_f	*current fall time*	Free wheeling diode:			33		ns
E_{on}	*turn-on energy per pulse*	Body diode @ V_{GS} = -5 V			4.90		mJ
E_{off}	*turn-off energy per pulse*				1.05		mJ
$E_{rec(off)}$	*reverse recovery losses at turn-off*				1.89		mJ
R_{thJC}	*thermal resistance junction to case*					0.22	K/W
R_{thJH}	*thermal resistance junction to heatsink*	with heatsink compound; IXYS test setup			0.30		K/W

Source-Drain Diode				Ratings			
Symbol	**Definitions**	**Conditions**		**min.**	**typ.**	**max.**	
V_{SD}	*forward voltage drop*	I_F = 70 A; V_{GS} = -5 V	T_{VJ} = 25°C		4.3		V
			T_{VJ} = 150°C		3.8		V
t_{rr}	*reverse recovery time*	V_{GS} = -5 V; I_F = 70 A; V_R = 1200 V	T_{VJ} = 25°C		24		ns
Q_{RM}	*reverse recovery charge (intrinsic diode)*	Mosfet gate drive:			1.4		µC
I_{RM}	*max. reverse recovery current*	V_{GS} = -5 / 20 V; R_G = 2.5 Ω			92		A
dI_F/dt	*current slew rate*				7300		A/µs
t_{rr}	*reverse recovery time*	V_{GS} = -5 V; I_F = 70 A; V_R = 1200 V	T_{VJ} = 150°C		38		ns
Q_{RM}	*reverse recovery charge (intrinsic diode)*	Mosfet gate drive:			3.9		µC
I_{RM}	*max. reverse recovery current*	V_{GS} = -5 / 20 V; R_G = 2.5 Ω			170		A
dI_F/dt	*current slew rate*				6350		A/µs

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

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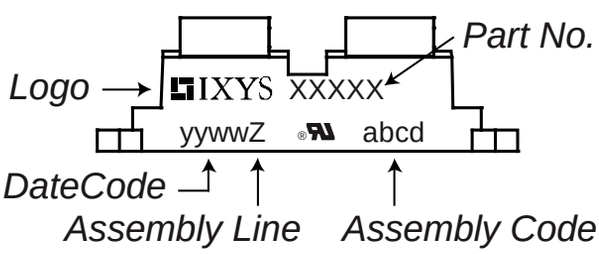
Package SOT-227B (minibloc)

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		150	°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	IXFN90N170SK	IXFN90N170SK	Tube	10	519108

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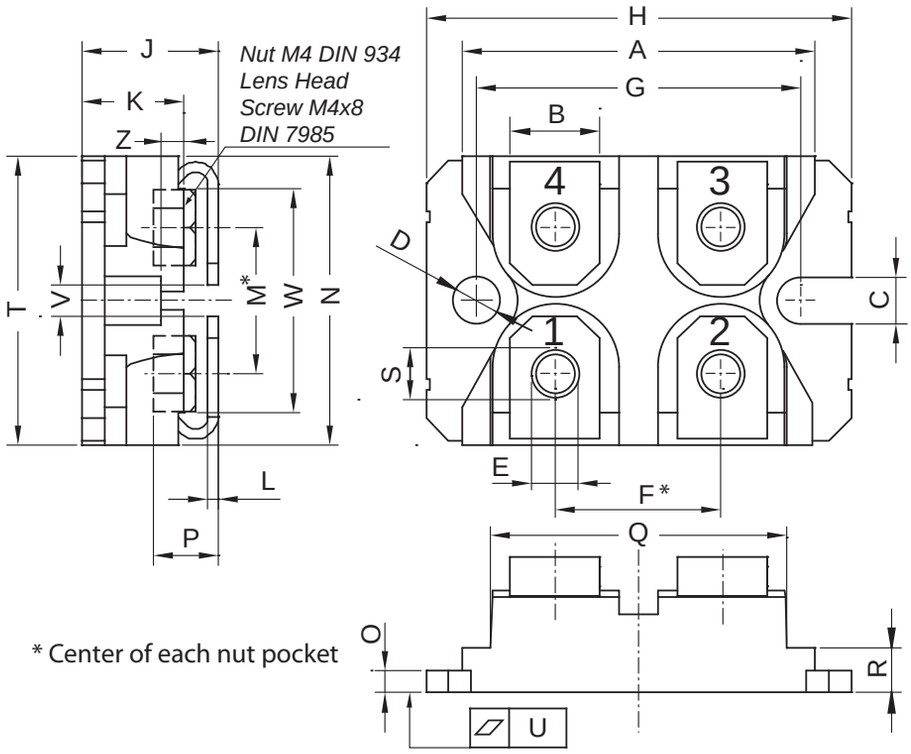
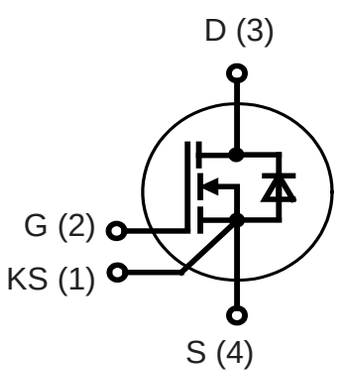
Outlines SOT-227B (minibloc)



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



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Curves

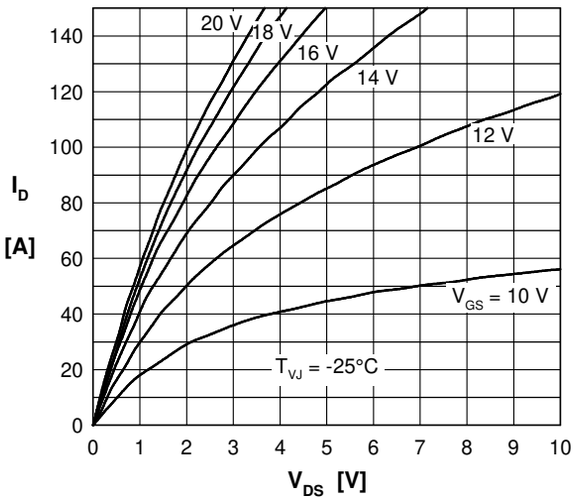

Fig. 1 Typical output characteristics (-25°C)

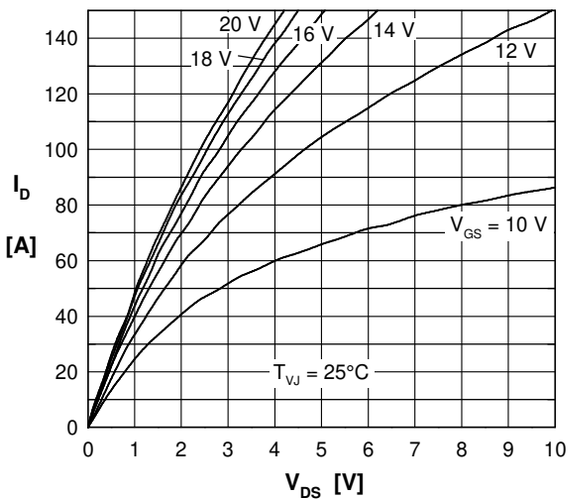

Fig. 2 Typical output characteristics (25°C)

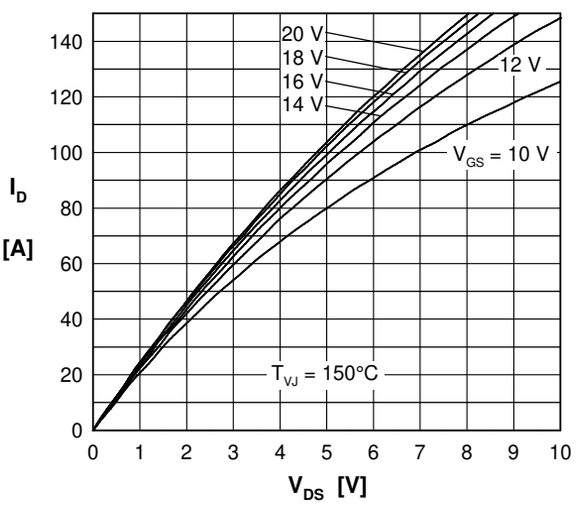

Fig. 3 Typical output characteristics (150°C)

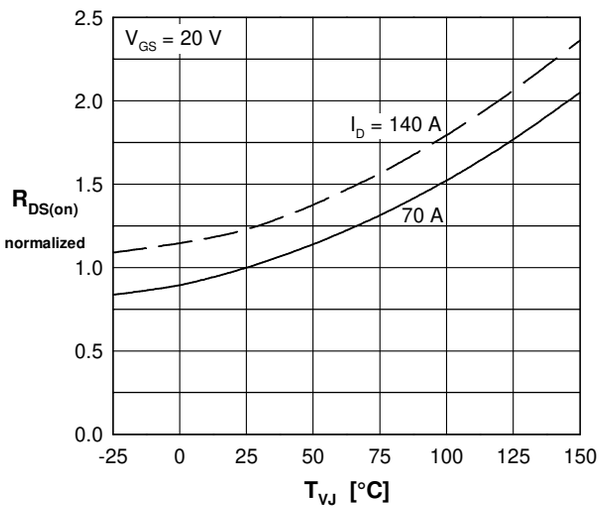

Fig. 4 $R_{DS(on)}$ normalized vs. junction temperature T_{VJ}

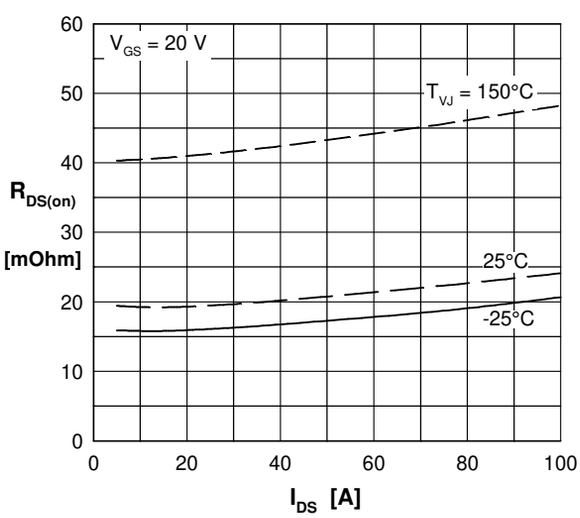

Fig. 5 $R_{DS(on)}$ versus drain current

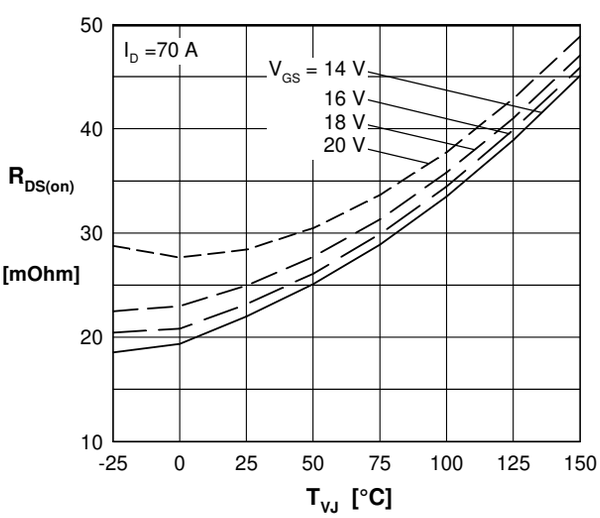

Fig. 6 $R_{DS(on)}$ versus junction temperature T_{VJ}

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Curves

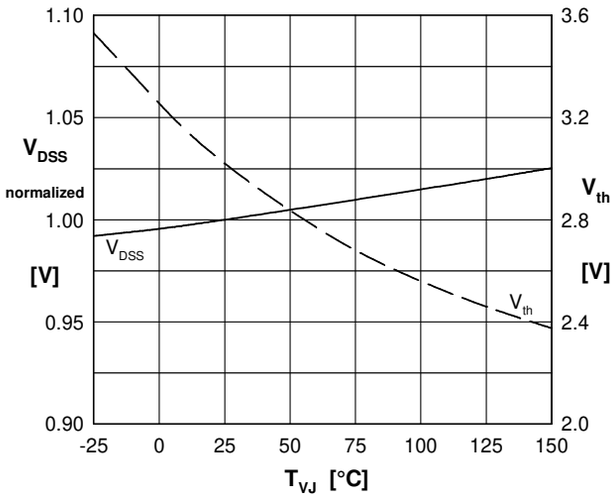

Fig. 7 Treshhold voltage V_{TH} and normalized V_{DSS} versus junction temperature T_{VJ}

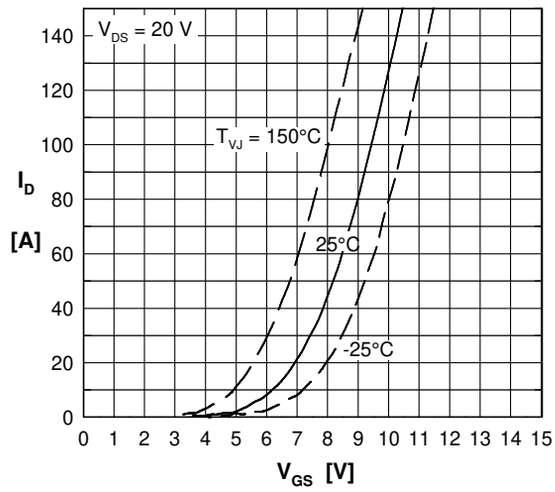

Fig. 8 Typical transfer characteristics

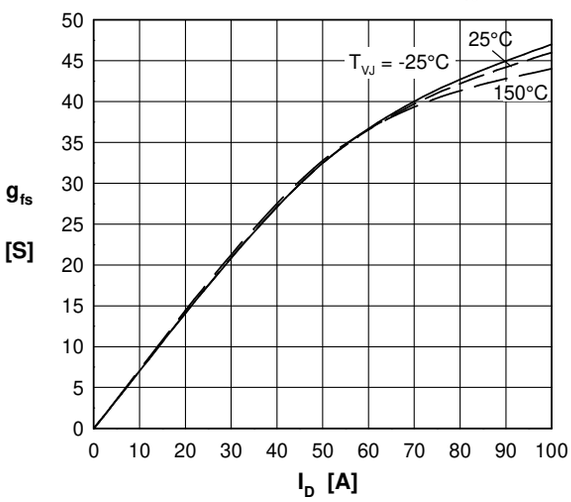

Fig. 9 Typical forward transconductance

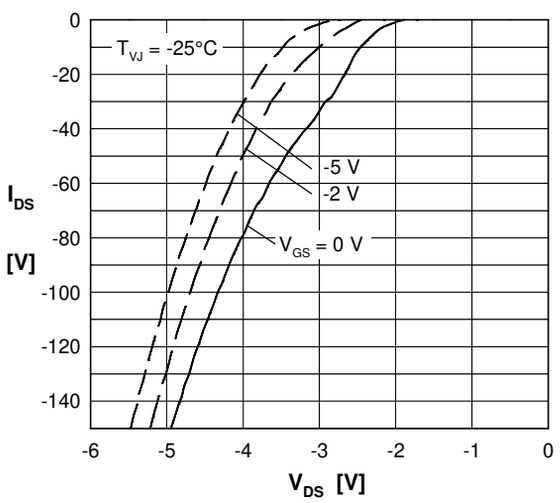

Fig. 10 Forward voltage drop of intrinsic diode versus V_{DS} measured at -25°C

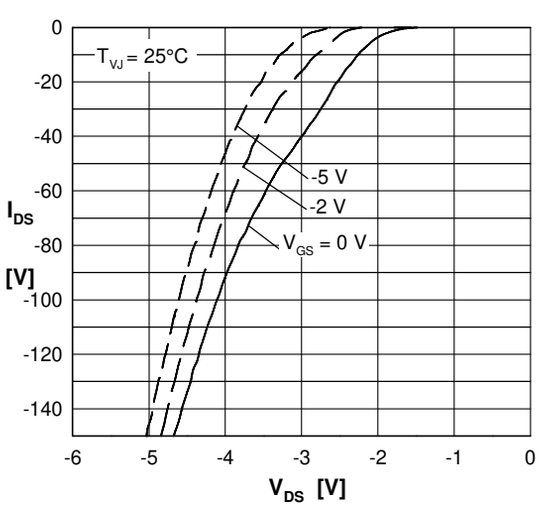

Fig. 11 Forward voltage drop of intrinsic diode versus V_{DS} measured at 25°C

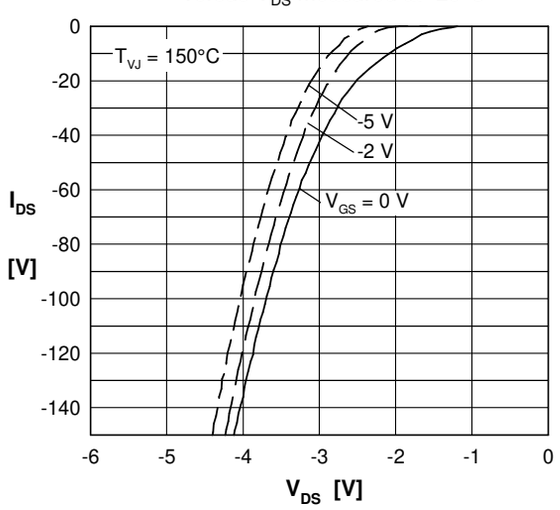

Fig. 12 Forward voltage drop of intrinsic diode versus V_{DS} measured at 150°C

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Curves

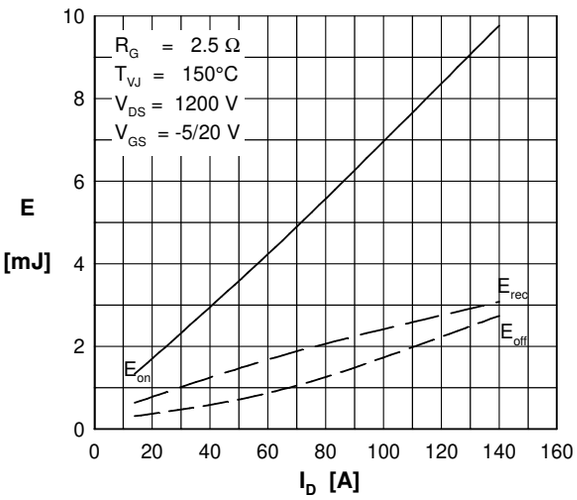

Fig. 13 Typical switching energy versus drain current

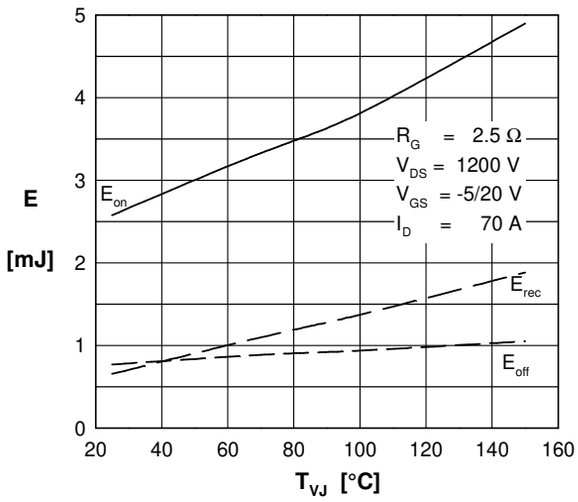

Fig. 14 Typical switching energy versus temperature

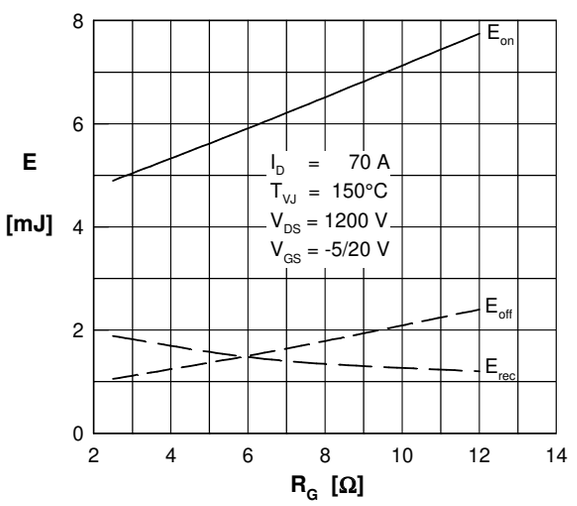

Fig. 15 Typical switching energy versus external gate resistor

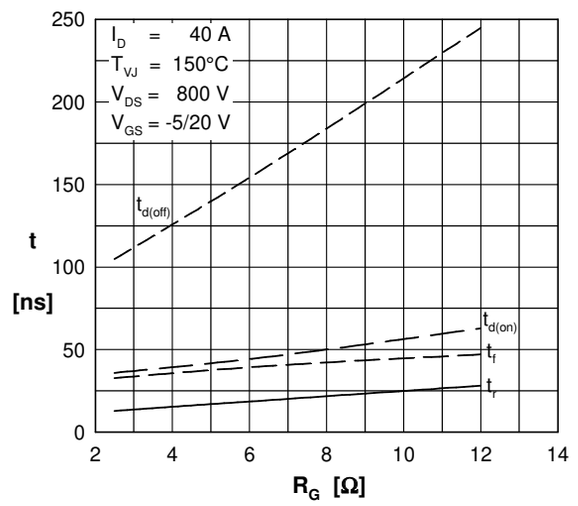

Fig. 16 Typical switching time versus external gate resistor

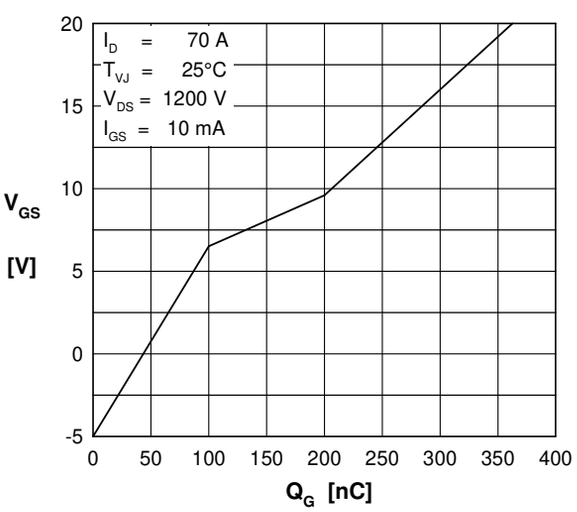

Fig. 17 Typical turn on gate charge, trendline

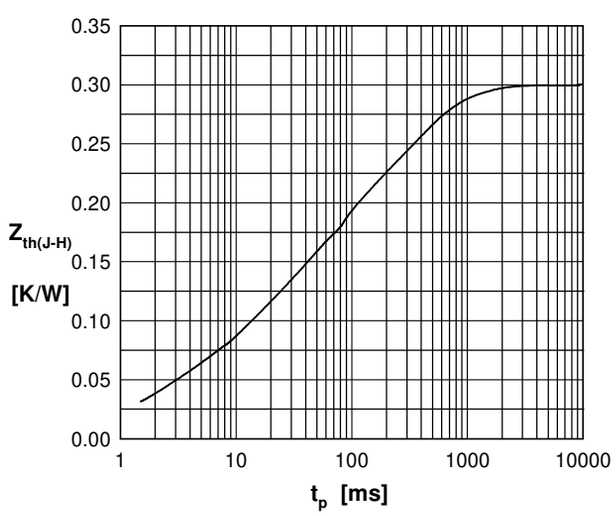

Fig. 18 Typical transient thermal impedance

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