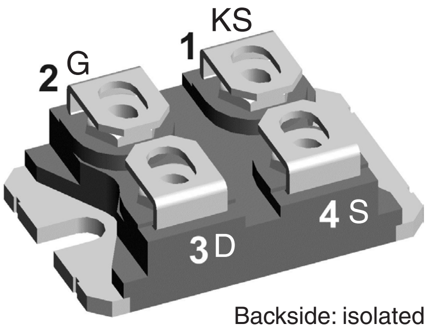
SiC Power MOSFET

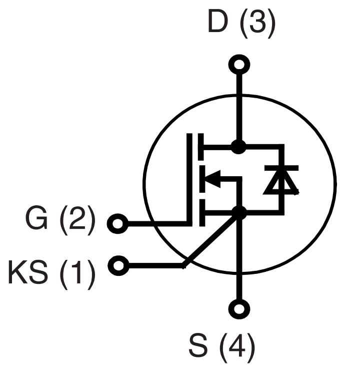
I_{D25} = 90 A
V_{DSS} = 1700 V
$R_{DS(on)\,max}$ = 35 mΩ

Kelvin Source gate connection

Part number
IXFN90N170SK



Backside: isolated
E72873



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: 2500 V~
- Industry standard outline
- RoHS compliant
- Epoxy meets UL 94V-0
- Base plate with Aluminium nitride isolation
- Advanced power cycling

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MOSFET

Symbol	Definitions	Conditions		min.	typ.	max.	Unit
$V_{(BR)DSS}$	*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; T_{VJ} = 25°C			376		nC
Q_{gs}	*gate source charge*				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

Symbol	Definitions	Conditions		min.	typ.	max.	Unit
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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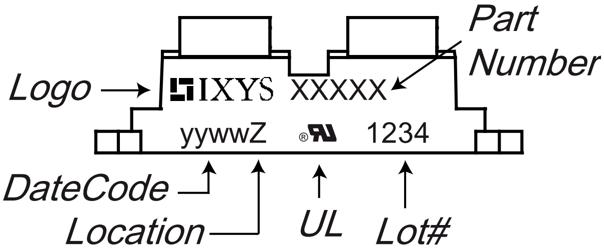
Package	Outlines SOT-227B (minibloc)		Ratings			
Symbol	**Definitions**	**Conditions**	**min.**	**typ.**	**max.**	**Unit**
I_{RMS}	*RMS current*	per terminal			100	A
T_{stg} T_{op} T_{VJ}	*storage temperature* *operation temperature* *virtual junction temperature*		-40 -40 -40		150 150 175	°C °C °C
Weight				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	IXFN90N170SK	IXFN90N170SK	Tube	10	IXFN90N170SK

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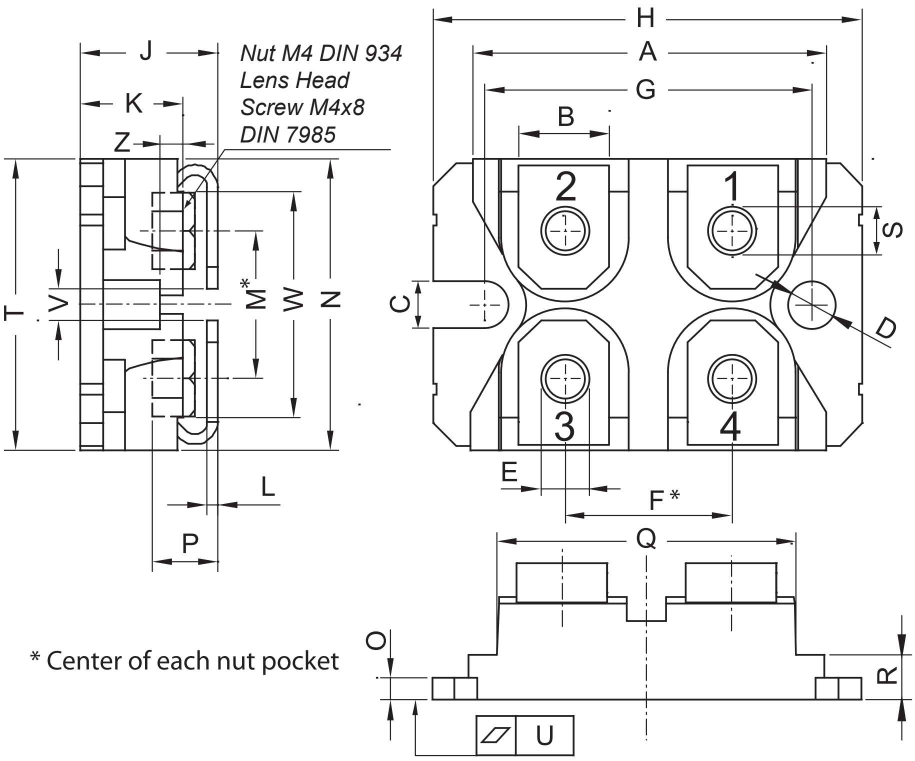
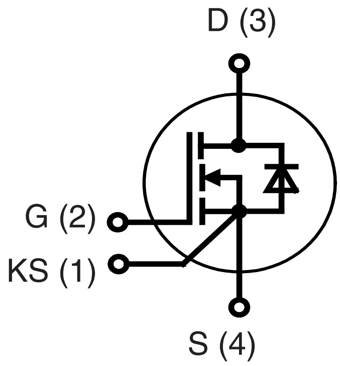
Outlines SOT-227B (minibloc)



* 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

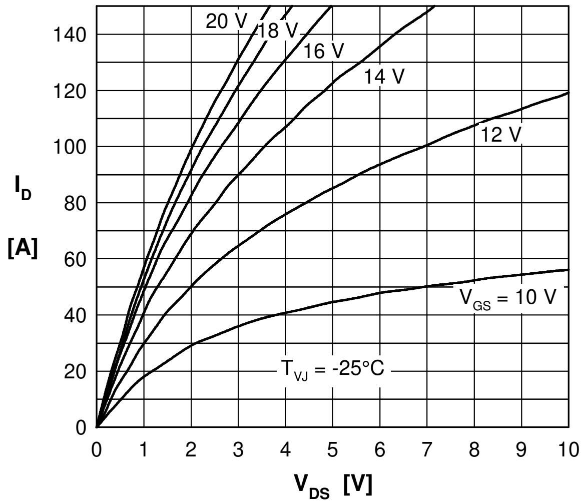

Fig. 1 Typical output characteristics (-25°C)

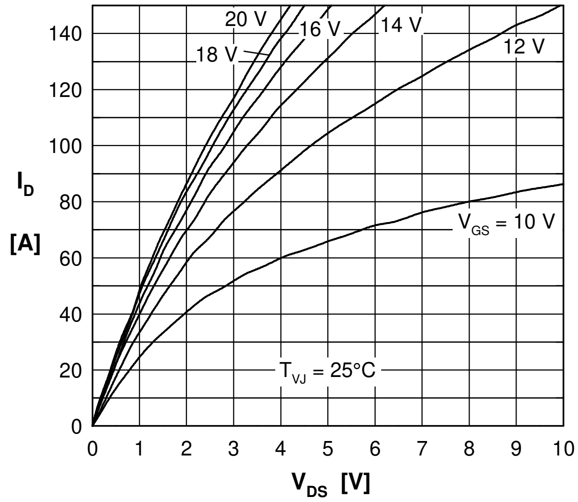

Fig. 2 Typical output characteristics (25°C)

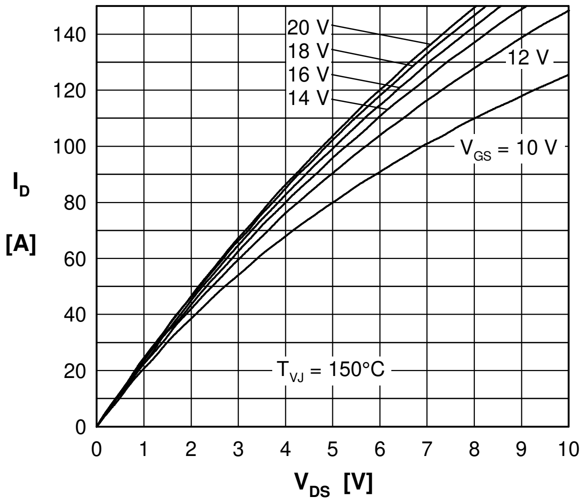

Fig. 3 Typical output characteristics (150°C)

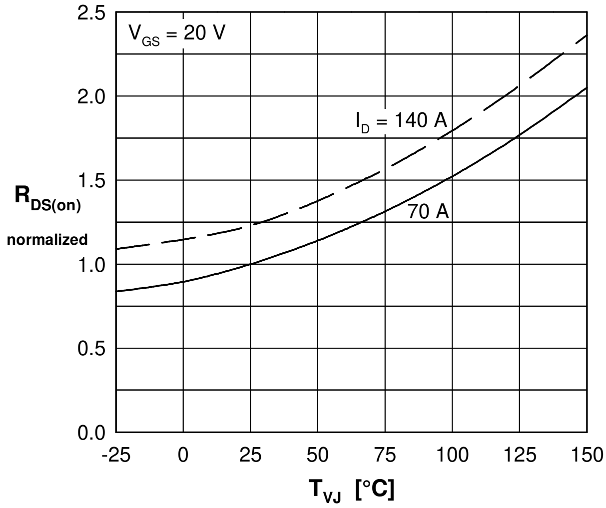

Fig. 4 $R_{DS(on)}$ normalized vs. junction temperature T_{VJ}

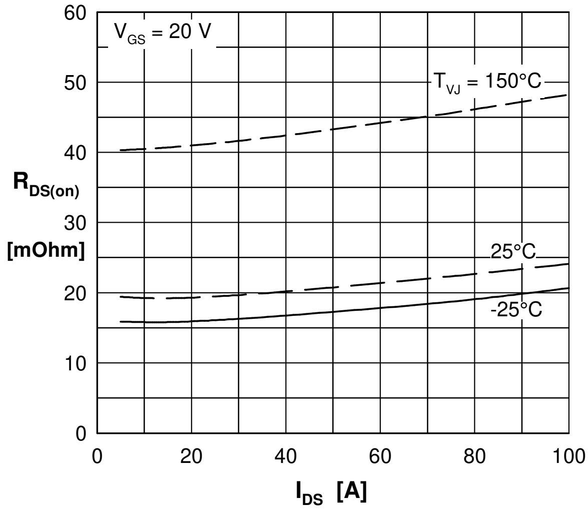

Fig. 5 $R_{DS(on)}$ versus drain current

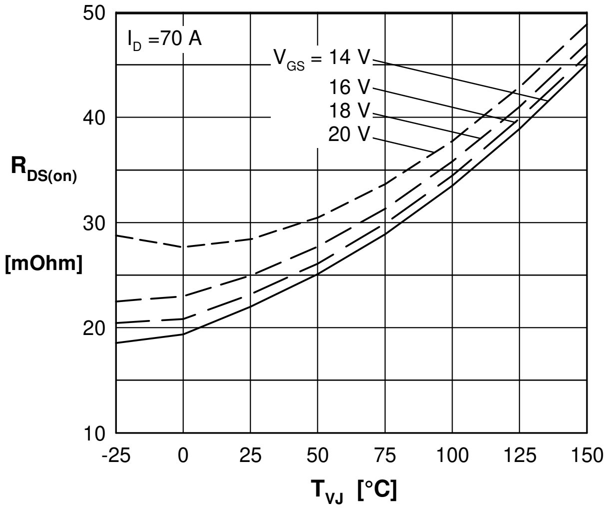

Fig. 6 $R_{DS(on)}$ versus junction temperature T_{VJ}

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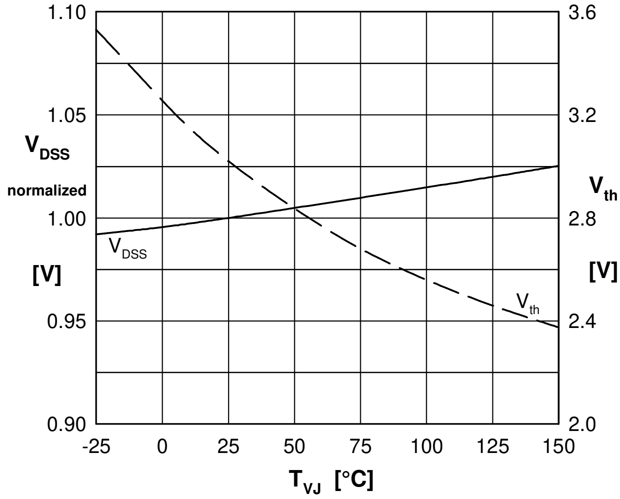

Fig. 7 Treshhold voltage V_{TH} and normalized V_{DSS} versus junction temperature T_{VJ}

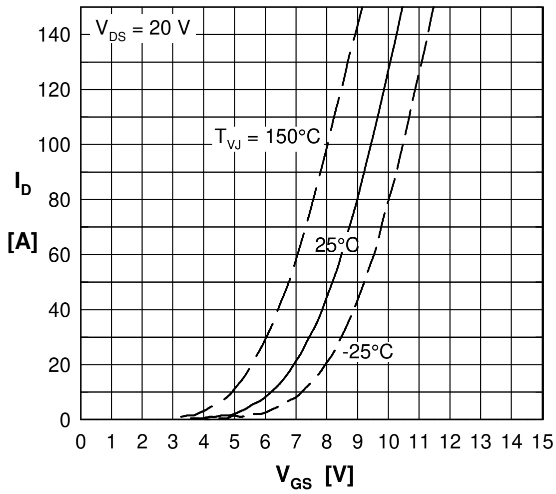

Fig. 8 Typical transfer characteristics

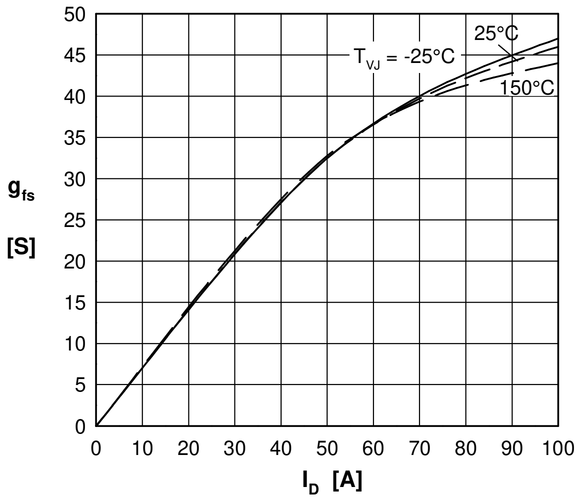

Fig. 9 Typical forward transconductance

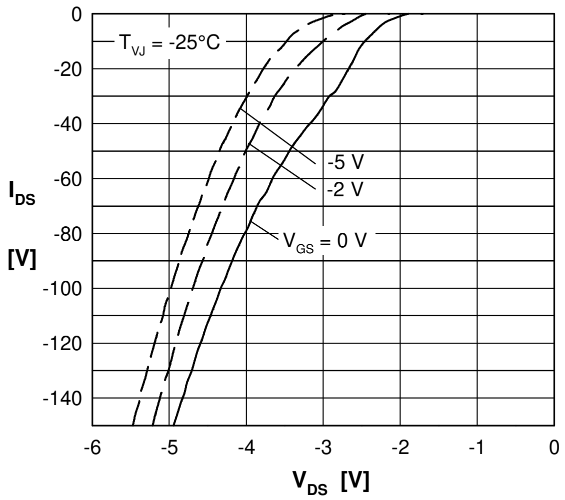

Fig. 10 Forward voltage drop of intrinsic diode versus V_{DS} measured at -25°C

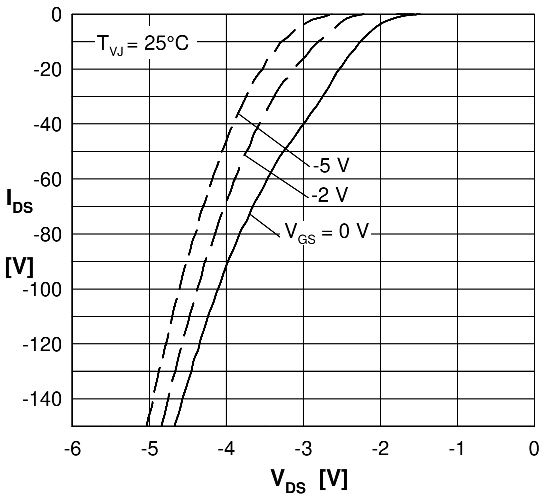

Fig. 11 Forward voltage drop of intrinsic diode versus V_{DS} measured at 25°C

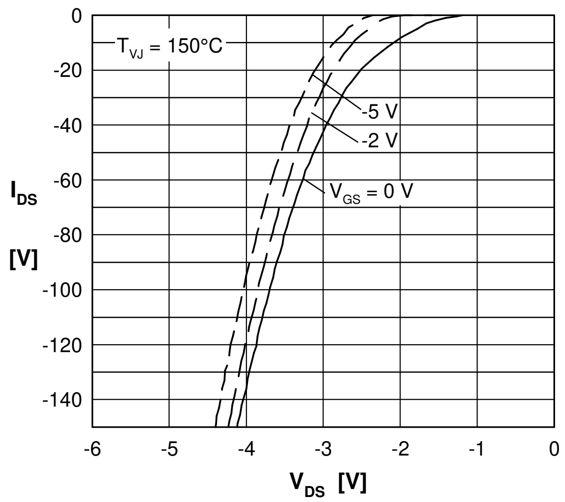

Fig. 12 Forward voltage drop of intrinsic diode versus V_{DS} measured at 150°C

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Curves

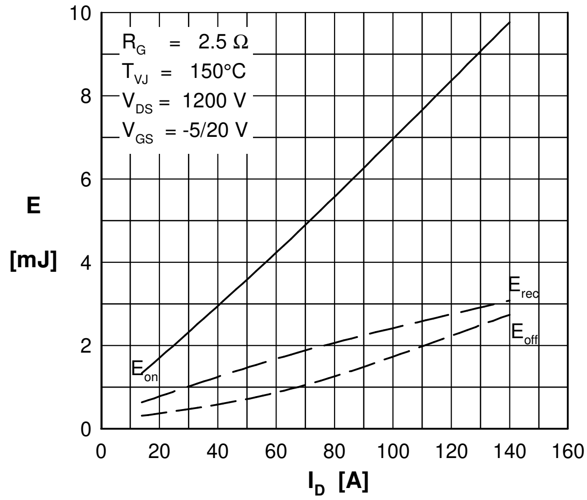

Fig. 13 Typical switching energy versus drain current

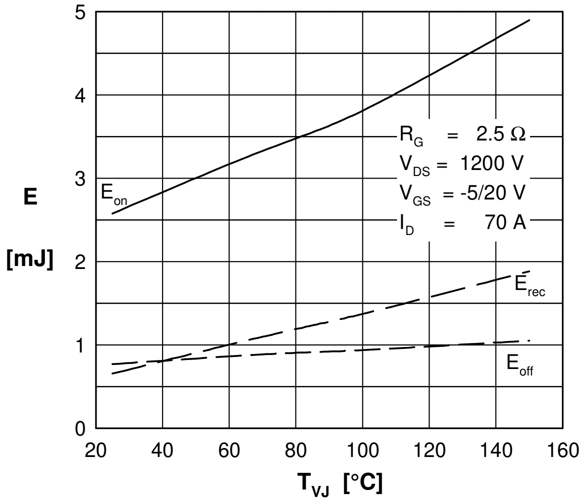

Fig. 14 Typical switching energy versus temperature

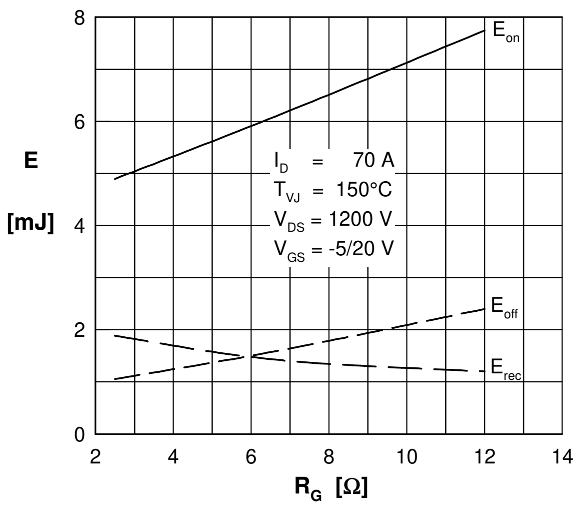

Fig. 15 Typical switching energy versus external gate resistor

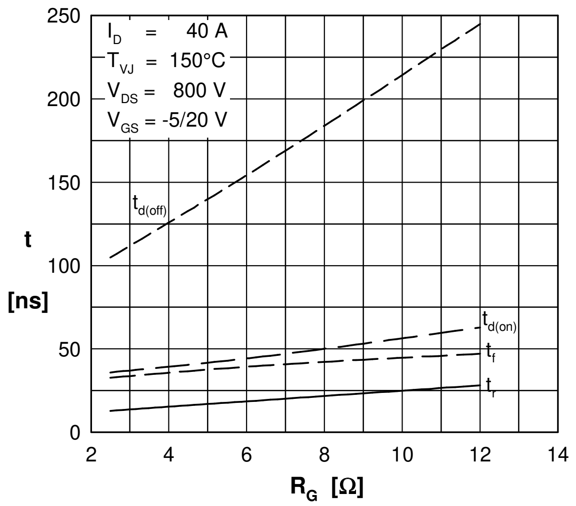

Fig. 16 Typical switching time versus external gate resistor

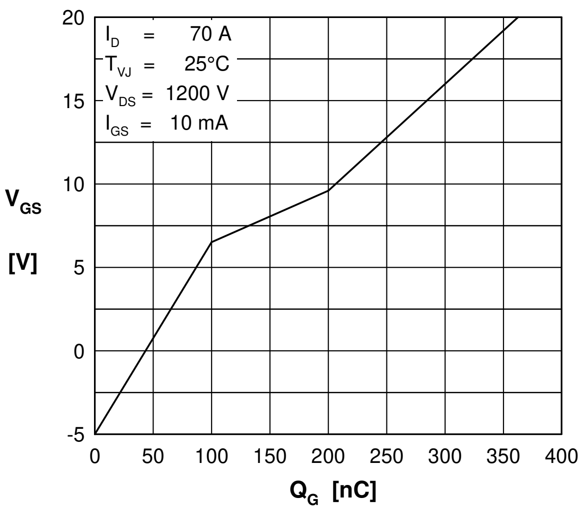

Fig. 17 Typical turn on gate charge, trendline

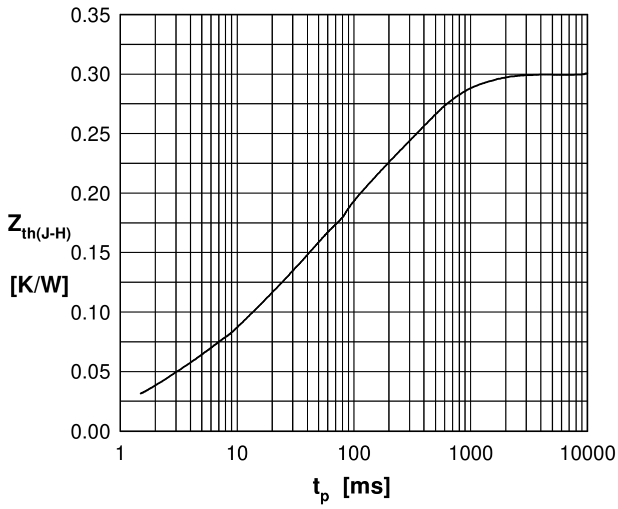

Fig. 18 Typical transient thermal impedance

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