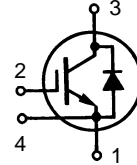


# IGBT with Diode

# IXSN 35N100U1

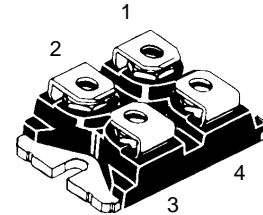
$V_{CES} = 1000\text{ V}$   
 $I_{C25} = 38\text{ A}$   
 $V_{CE(sat)} = 3.5\text{ V}$

High Short Circuit SOA Capability



Symbol	Test Conditions	Maximum Ratings	
$V_{CES}$	$T_J = 25^\circ\text{C to } 150^\circ\text{C}$	1000	V
$V_{CGR}$	$T_J = 25^\circ\text{C to } 150^\circ\text{C}; R_{GE} = 1\text{ M}\Omega$	1000	A
$V_{GES}$	Continuous	$\pm 20$	V
$V_{GEM}$	Transient	$\pm 30$	V
$I_{C25}$	$T_C = 25^\circ\text{C}$	38	A
$I_{C90}$	$T_C = 90^\circ\text{C}$	25	A
$I_{CM}$	$T_C = 25^\circ\text{C}, 1\text{ ms}$	50	A
<b>SSOA (RBSOA)</b>	$V_{GE} = 15\text{ V}, T_{VJ} = 125^\circ\text{C}, R_G = 22\ \Omega$ Clamped inductive load, $L = 30\ \mu\text{H}$	$I_{CM} = 50$ @ $0.8\ V_{CES}$	A
<b><math>t_{SC}</math> (SCSOA)</b>	$V_{GE} = 15\text{ V}, V_{CE} = 0.6 \cdot V_{CES}, T_J = 125^\circ\text{C}$ $R_G = 22\ \Omega$ , non repetitive	10	$\mu\text{s}$
$P_c$	$T_C = 25^\circ\text{C}$	205	W
$V_{ISOL}$	50/60 Hz	$t = 1\text{ min}$	2500 V~
	$I_{ISOL} \leq 1\text{ mA}$	$t = 1\text{ s}$	3000 V~
$T_J$		-40 ... +150	$^\circ\text{C}$
$T_{JM}$		150	$^\circ\text{C}$
$T_{stg}$		-40 ... +150	$^\circ\text{C}$
$M_d$	Mounting torque	1.5/13	Nm/lb.in.
	Terminal connection torque (M4)	1.5/13	Nm/lb.in.
<b>Weight</b>		30	g

miniBLOC, SOT-227 B



1 = Emitter,            3 = Collector  
 2 = Gate,              4 = Kelvin Emitter

### Features

- International standard package miniBLOC (ISOTOP) compatible
- Isolation voltage 3000 V~
- 2nd generation HDMOS™ process
  - for high short circuit SOA
- Low  $V_{CE(sat)}$ 
  - for minimum on-state conduction losses
- MOS Gate turn-on
  - drive simplicity
- Fast Recovery Epitaxial Diode (FRED)
  - short  $t_{tr}$  and  $I_{RM}$
- Low collector-to-case capacitance (< 50 pF)
  - reduces RFI
- Low package inductance (< 10 nH)
  - easy to drive and to protect

### Applications

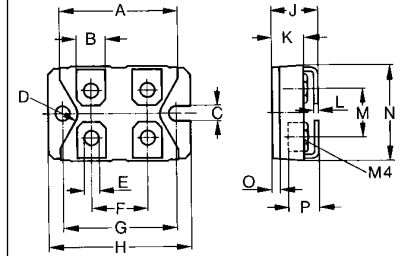
- AC motor speed control
- DC servo and robot drives
- DC choppers
- Uninterruptible power supplies (UPS)
- Switch-mode and resonant-mode power supplies

### Advantages

- Space savings
- Easy to mount with 2 screws
- High power density

Symbol	Test Conditions	Characteristic Values ( $T_J = 25^\circ\text{C}$ , unless otherwise specified)		
		min.	typ.	max.
$BV_{CES}$	$I_C = 6\text{ mA}, V_{GE} = 0\text{ V}$	1000		V
$V_{GE(th)}$	$I_C = 10\text{ mA}, V_{CE} = V_{GE}$	5		V
$I_{CES}$	$V_{CE} = 0.8 \cdot V_{CES}$ $V_{GE} = 0\text{ V}$	$T_J = 25^\circ\text{C}$		750 $\mu\text{A}$
		$T_J = 125^\circ\text{C}$		15 mA
$I_{GES}$	$V_{CE} = 0\text{ V}, V_{GE} = \pm 20\text{ V}$			$\pm 500\text{ nA}$
$V_{CE(sat)}$	$I_C = I_{C90}, V_{GE} = 15\text{ V}$			3.5 V

Symbol	Test Conditions	Characteristic Values ( $T_J = 25^\circ\text{C}$ , unless otherwise specified)		
		min.	typ.	max.
$g_{fs}$	$I_C = I_{C90}$ ; $V_{CE} = 20\text{ V}$ , Pulse test, $t \leq 300\ \mu\text{s}$ , duty cycle $d \leq 2\%$	10	20	S
$I_{C(on)}$	$V_{GE} = 15\text{ V}$		300	A
$C_{ies}$	$V_{CE} = 25\text{ V}$ , $V_{GE} = 0\text{ V}$ , $f = 1\text{ MHz}$		4.5	nF
$C_{oes}$			0.5	nF
$C_{res}$			0.09	nF
$Q_g$	$I_C = I_{C90}$ , $V_{GE} = 15\text{ V}$ , $V_{CE} = 0.5 V_{CES}$		180	nC
$Q_{ge}$			45	nC
$Q_{gc}$			120	nC
$t_{d(on)}$	<b>Inductive load, <math>T_J = 125^\circ\text{C}</math></b> $I_C = I_{C90}$ , $V_{GE} = 15\text{ V}$ , $V_{CE} = 0.6 \cdot V_{CES}$ , $R_{on} = 6.8\ \Omega$ , $R_{off} = 22\ \Omega$ Remarks: Switching times may increase for $V_{CE}$ (Clamp) $> 0.6 \cdot V_{CES}$ , higher $T_J$ or increased $R_G$		80	ns
$t_{ri}$			150	ns
$t_{d(off)}$			800	ns
$t_{fi}$			2000	ns
$E_{on}$			3.2	mJ
$E_{off}$			6.8	mJ
$R_{thJC}$			0.61	K/W
$R_{thCK}$		0.05		K/W

**miniBLOC, SOT-227 B**


M4 screws (4x) supplied

Dim.	Millimeter		Inches	
	Min.	Max.	Min.	Max.
A	31.5	31.7	1.241	1.249
B	7.8	8.2	0.307	0.323
C	4.0	-	0.158	-
D	4.1	4.3	0.162	0.169
E	4.1	4.3	0.162	0.169
F	14.9	15.1	0.587	0.595
G	30.1	30.3	1.186	1.193
H	38.0	38.2	1.497	1.505
J	11.8	12.2	0.465	0.481
K	8.9	9.1	0.351	0.359
L	0.75	0.85	0.030	0.033
M	12.6	12.8	0.496	0.504
N	25.2	25.4	0.993	1.001
O	1.95	2.05	0.077	0.081
P	-	5.0	-	0.197

**Reverse Diode (FRED)**

Symbol	Test Conditions	Characteristic Values ( $T_J = 25^\circ\text{C}$ , unless otherwise specified)		
		min.	typ.	max.
$V_F$	$I_F = I_{C90}$ , $V_{GE} = 0\text{ V}$ , Pulse test, $t \leq 300\ \mu\text{s}$ , duty cycle $d \leq 2\%$			2.3 V
$I_{RM}$	$I_F = I_{C90}$ , $V_{GE} = 0\text{ V}$ , $-di_F/dt = 480\text{ A}/\mu\text{s}$ $T_J = 125^\circ\text{C}$ , $V_R = 360\text{ V}$		150	33 A
$t_{tr}$				ns
$R_{thJC}$				0.7 K/W

 IXYS MOSFETs and IGBTs are covered by one of the following U.S.patents: 4,835,592 4,881,108 5,017,508 5,049,961 5,187,117 5,486,715  
 4,850,072 4,931,844 5,034,796 5,063,307 5,237,481 5,381,025

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

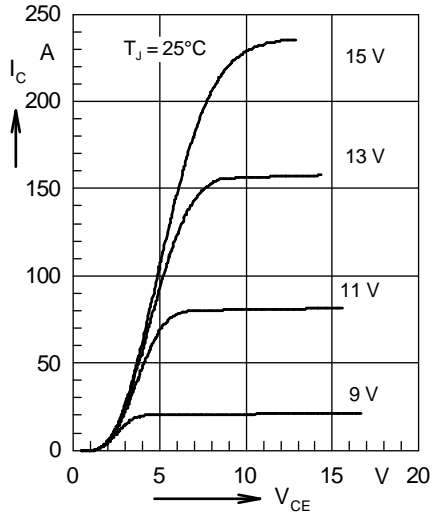


Fig. 1 Typ. output characteristics

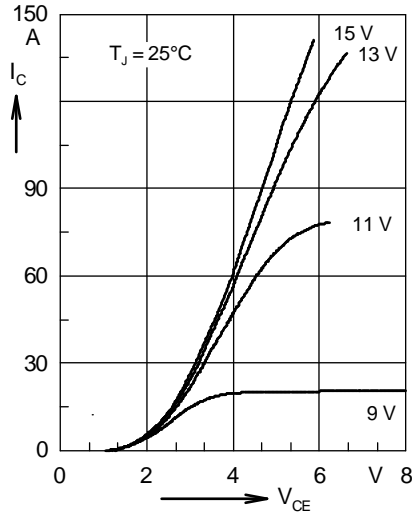


Fig. 2 Typ. output characteristics

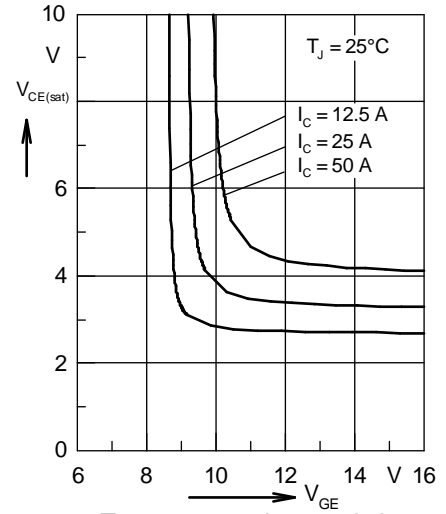


Fig. 3 Typ. on-state characteristics

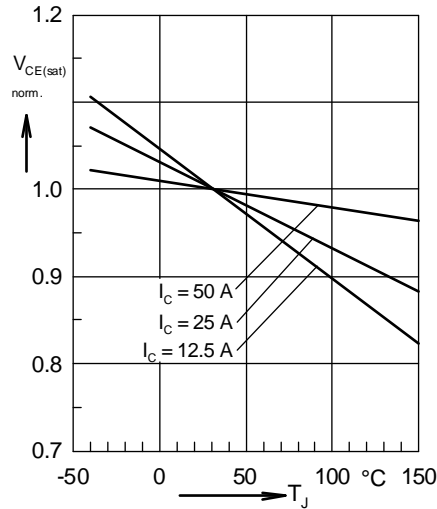


Fig. 4 Typ. temp. dependence of  $V_{CE(sat)}$

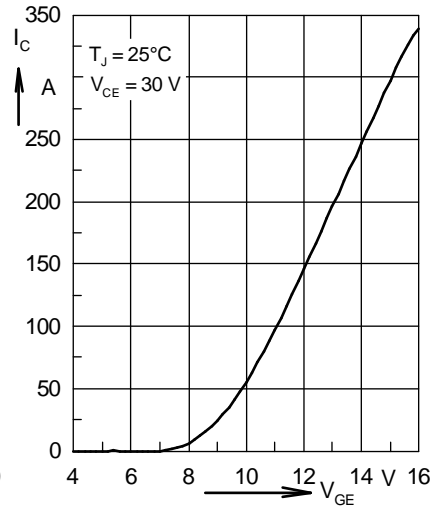


Fig. 5 Typ. transfer characteristics

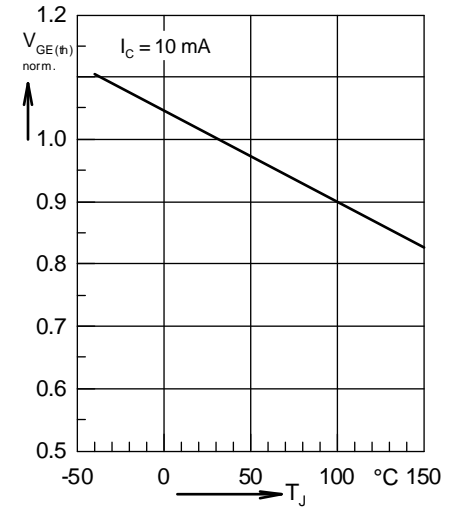


Fig. 6 Typ. temp. dependence of norm.  $V_{GE(th)}$

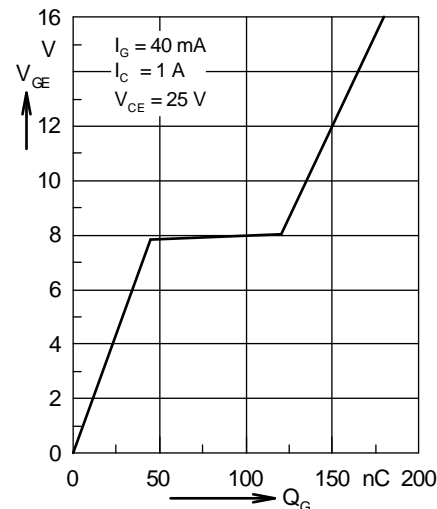


Fig. 7 Typ. turn-on gate charge characteristics,  $V_{GE} = f(Q_G)$

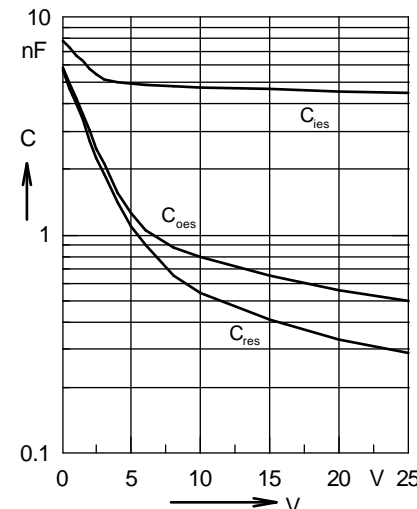


Fig. 8 Typ. capacitances

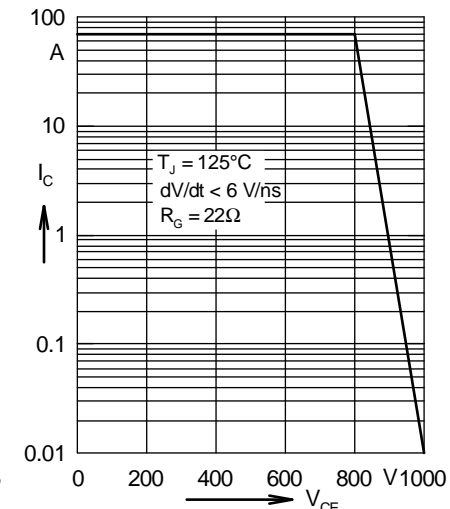


Fig. 9 Reverse biased safe operating area

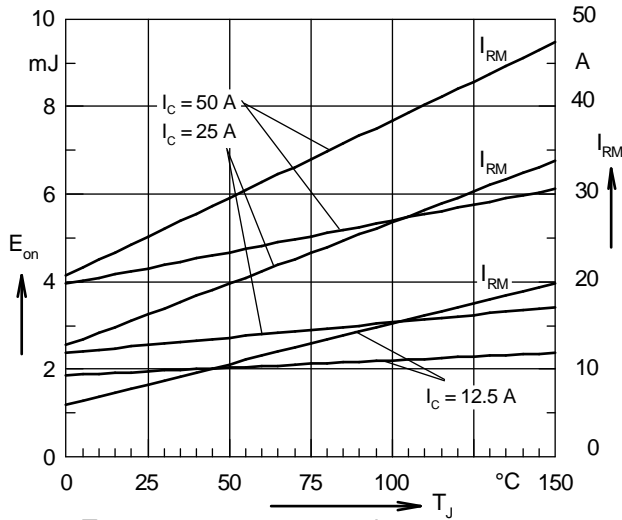


Fig. 10 Typ. turn-on energy per pulse

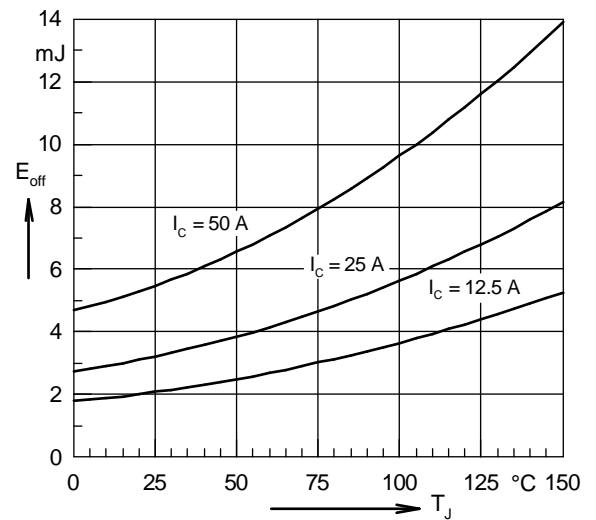


Fig. 11 Typ. turn-off energy per pulse

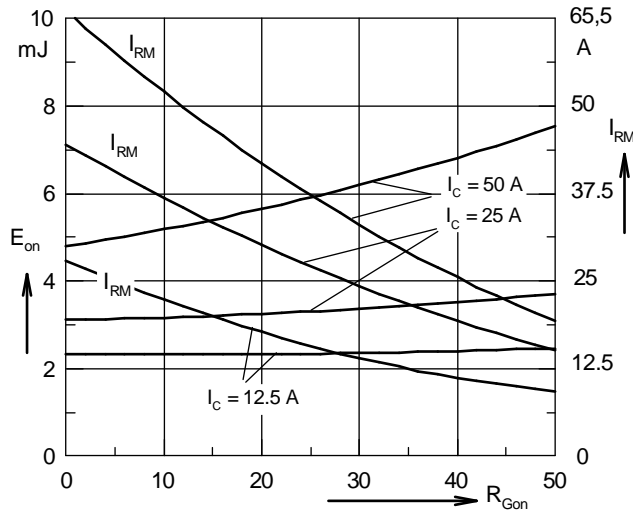


Fig. 12 Typ. turn-on energy per pulse

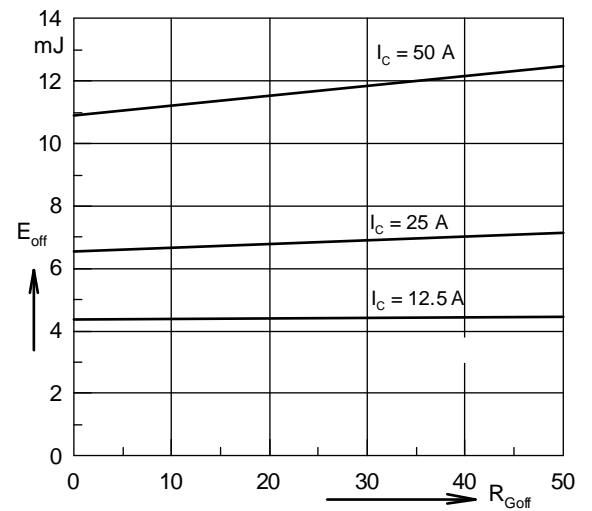


Fig. 13 Typ. turn-off energy per pulse

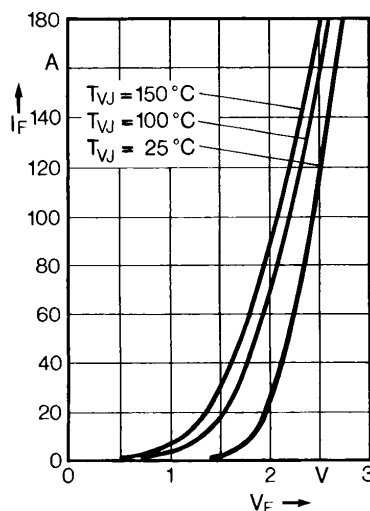


Fig. 14 Forward characteristic of reverse diode

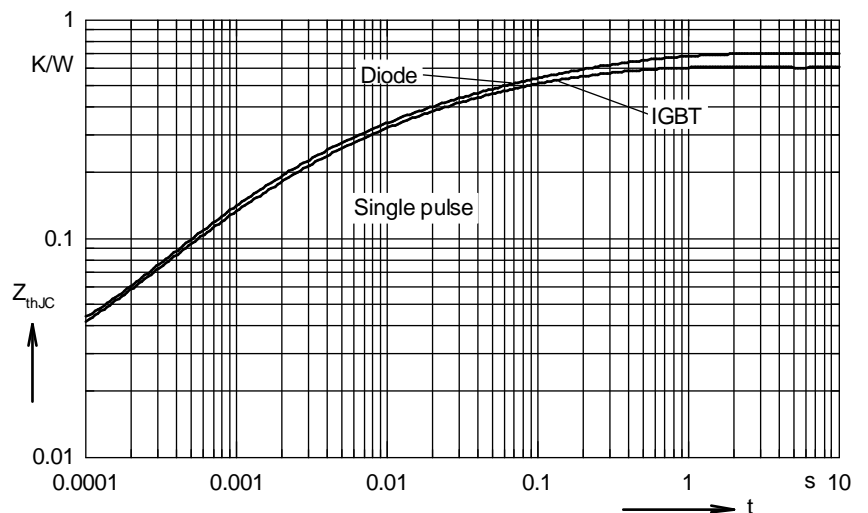


Fig. 15 Transient thermal resistance junction to case of IGBT and Diode

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



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

IXYS Corporation  
3540 Bassett Street, Santa Clara CA 95054  
Phone: 408-982-0700, Fax: 408-496-0670

IXYS Semiconductor GmbH  
Edisonstr. 15, D-68623 Lampertheim  
Phone: +49-6206-503-0, Fax: +49-6206-503627