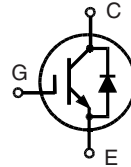


# High Voltage IGBT with optional Diode

Short Circuit SOA Capability  
Square RBSOA

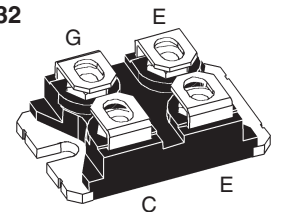


$$V_{CES} = 1200 \text{ V}$$

$$I_{C25} = 100 \text{ A}$$

$$V_{CE(sat) \text{ typ}} = 2.3 \text{ V}$$

miniBLOC, SOT-227 B  
E153432



E = Emitter ①, C = Collector  
G = Gate, E = Emitter ①

① Either Emitter terminal can be used as Main or Kelvin Emitter

### Features

- NPT IGBT technology
- low saturation voltage
- low switching losses
- square RBSOA, no latch up
- high short circuit capability
- positive temperature coefficient for easy paralleling
- MOS input, voltage controlled
- optional ultra fast diode
- International standard package miniBLOC

### Advantages

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

### Typical Applications

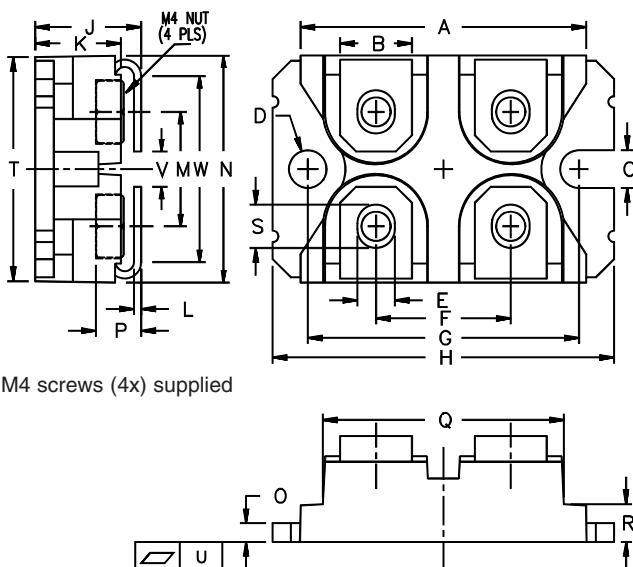
- AC motor speed control
- DC servo and robot drives
- DC choppers
- Uninterruptible power supplies (UPS)
- Switch-mode and resonant-mode power supplies

Symbol	Conditions	Maximum Ratings	
$V_{CES}$	$T_J = 25^\circ\text{C}$ to $150^\circ\text{C}$	1200	V
$V_{CGR}$	$T_J = 25^\circ\text{C}$ to $150^\circ\text{C}$ ; $R_{GE} = 20 \text{ k}\Omega$	1200	V
$V_{GES}$	Continuous	$\pm 20$	V
$V_{GEM}$	Transient	$\pm 30$	V
$I_{C25}$	$T_C = 25^\circ\text{C}$	100	A
$I_{C90}$	$T_C = 90^\circ\text{C}$	62	A
$I_{CM}$	$T_C = 90^\circ\text{C}$ , $t_p = 1 \text{ ms}$	124	A
<b>RBSOA</b>	$V_{GE} = \pm 15 \text{ V}$ , $T_J = 125^\circ\text{C}$ , $R_G = 22 \Omega$ Clamped inductive load, $L = 30 \mu\text{H}$	$I_{CM} = 100$ $V_{CEK} < V_{CES}$	A
$t_{SC}$ <b>(SCSOA)</b>	$V_{GE} = \pm 15 \text{ V}$ , $V_{CE} = V_{CES}$ , $T_J = 125^\circ\text{C}$ $R_G = 22 \Omega$ , non repetitive	10	$\mu\text{s}$
$P_C$	$T_C = 25^\circ\text{C}$	IGBT Diode	450 220 W W
$V_{ISOL}$	50/60 Hz; $I_{ISOL} \leq 1 \text{ mA}$	2500	V~
$T_J$		-40 ... +150	$^\circ\text{C}$
$T_{stg}$		-40 ... +150	$^\circ\text{C}$
$M_d$	Mounting torque Terminal connection torque (M4)	1.5/13 1.5/13	Nm/lb.in. Nm/lb.in.
<b>Weight</b>		30	g

Symbol	Conditions	Characteristic Values ( $T_J = 25^\circ\text{C}$ , unless otherwise specified)		
		min.	typ.	max.
$V_{(BR)CES}$	$V_{GE} = 0 \text{ V}$	1200		V
$V_{GE(th)}$	$I_C = 2 \text{ mA}$ , $V_{CE} = V_{GE}$	4.5		6.5 V
$I_{CES}$	$V_{CE} = V_{CES}$ $T_J = 25^\circ\text{C}$ $T_J = 125^\circ\text{C}$		6	3.8 mA mA
$I_{GES}$	$V_{CE} = 0 \text{ V}$ , $V_{GE} = \pm 20 \text{ V}$			$\pm 500 \text{ nA}$
$V_{CE(sat)}$	$I_C = 55 \text{ A}$ , $V_{GE} = 15 \text{ V}$	2.3	2.8	V

Symbol	Conditions	Characteristic Values		
		(T <sub>J</sub> = 25°C, unless otherwise specified)		
		min.	typ.	max.
C <sub>ies</sub>	V <sub>CE</sub> = 25 V, V <sub>GE</sub> = 0 V, f = 1 MHz		3300	pF
C <sub>oes</sub>			500	pF
C <sub>res</sub>			220	pF
Q <sub>g</sub>	I <sub>C</sub> = 50 A, V <sub>GE</sub> = 15 V, V <sub>CE</sub> = 0.5 V <sub>CES</sub>		240	nC
t <sub>d(on)</sub>	Inductive load, T <sub>J</sub> = 125°C I <sub>C</sub> = 55 A, V <sub>GE</sub> = ±15 V, V <sub>CE</sub> = 600 V, R <sub>G</sub> = 22 Ω		100	ns
t <sub>r</sub>			70	ns
t <sub>d(off)</sub>			500	ns
t <sub>f</sub>			70	ns
E <sub>on</sub>			8.4	mJ
E <sub>off</sub>			6.2	mJ
R <sub>thJC</sub>				0.28 K/W
R <sub>thCK</sub>	Package with heatsink compound		0.1	K/W

Symbol	Conditions	Characteristic Values		
		(T <sub>J</sub> = 25°C, unless otherwise specified)		
		min.	typ.	max.
V <sub>F</sub>	I <sub>F</sub> = 55 A, V <sub>GE</sub> = 0 V		2.4	V
	I <sub>F</sub> = 55 A, V <sub>GE</sub> = 0 V, T <sub>J</sub> = 125°C		1.9	V
I <sub>F</sub>	T <sub>C</sub> = 25°C			110 A
	T <sub>C</sub> = 90°C			60 A
I <sub>RM</sub>	I <sub>F</sub> = 55 A, -di <sub>F</sub> /dt = 400 A/μs, V <sub>R</sub> = 600 V		40	A
t <sub>rr</sub>	V <sub>GE</sub> = 0 V, T <sub>J</sub> = 125°C		200	ns
t <sub>rr</sub>	I <sub>F</sub> = 1 A, -di <sub>F</sub> /dt = 100 A/μs, V <sub>R</sub> = 30 V, V <sub>GE</sub> = 0 V		40	ns
R <sub>thJC</sub>				0.6 K/W

**miniBLOC, SOT-227 B**


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	38.20	1.489	1.505
J	11.68	12.22	0.460	0.481
K	8.92	9.60	0.351	0.378
L	0.76	0.84	0.030	0.033
M	12.60	12.85	0.496	0.506
N	25.15	25.42	0.990	1.001
O	1.98	2.13	0.078	0.084
P	4.95	5.97	0.195	0.235
Q	26.54	26.90	1.045	1.059
R	3.94	4.42	0.155	0.174
S	4.72	4.85	0.186	0.191
T	24.59	25.07	0.968	0.987
U	-0.05	0.1	-0.002	0.004
V	3.30	4.57	0.130	0.180
W	0.780	0.830	0.031	0.033

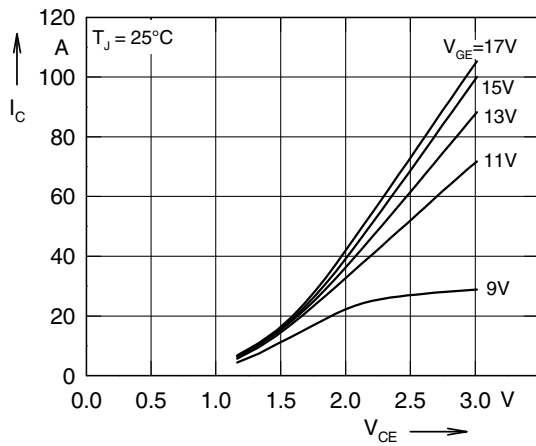


Fig. 1 Typ. output characteristics

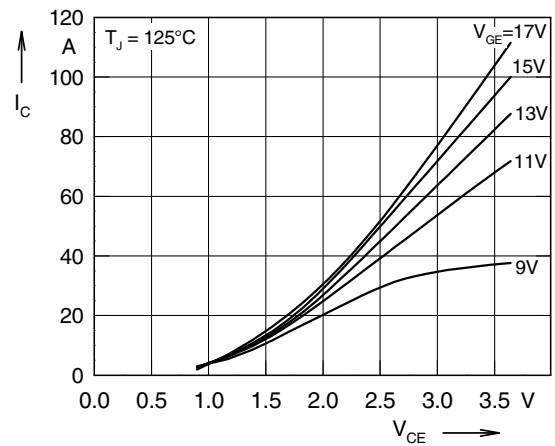


Fig. 2 Typ. output characteristics

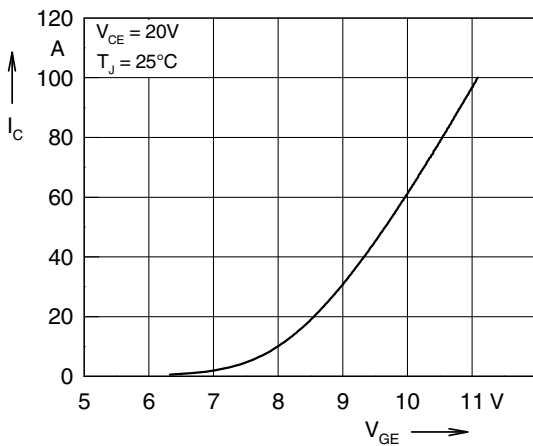


Fig. 3 Typ. transfer characteristics

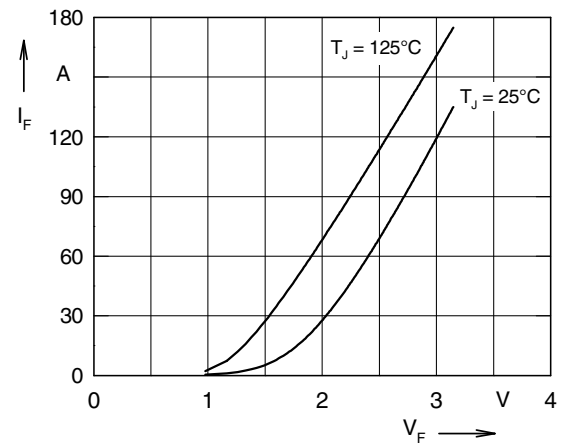


Fig. 4 Typ. forward characteristics of free wheeling diode

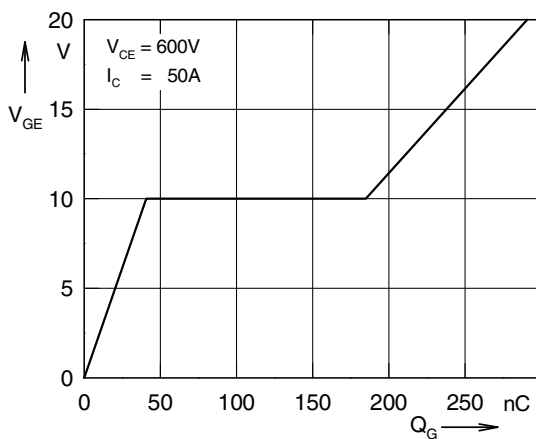


Fig. 5 Typ. turn on gate charge

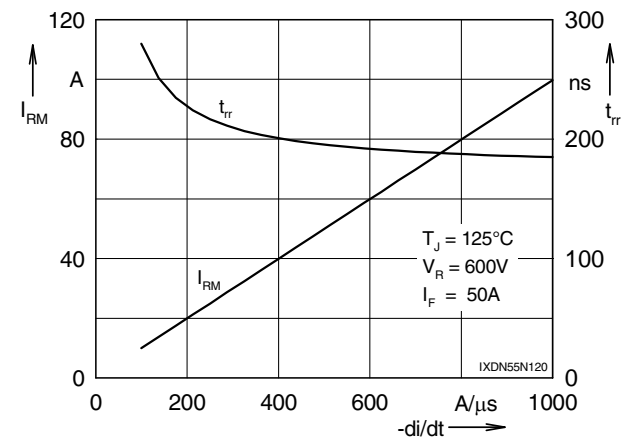


Fig. 6 Typ. turn off characteristics of free wheeling diode

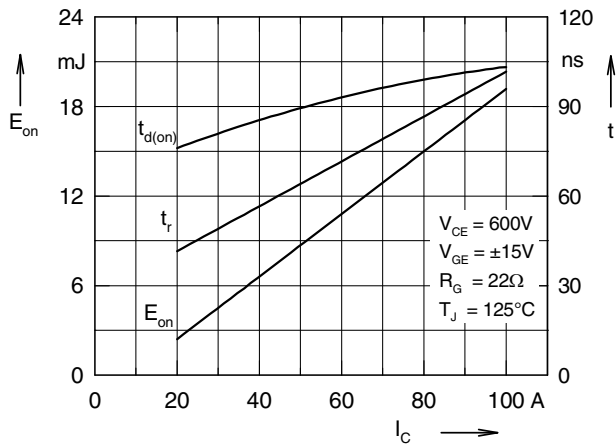


Fig. 7 Typ. turn on energy and switching times versus collector current

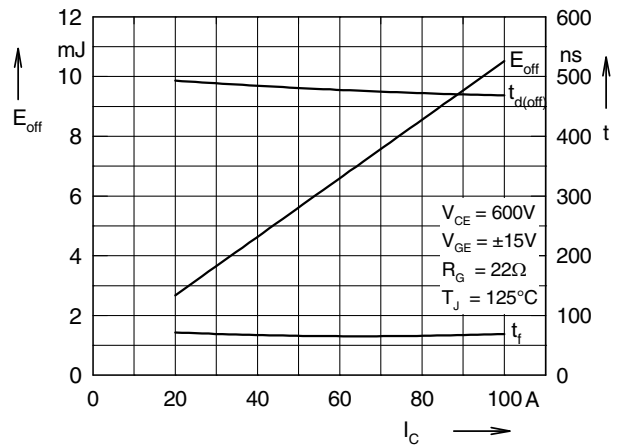


Fig. 8 Typ. turn off energy and switching times versus collector current

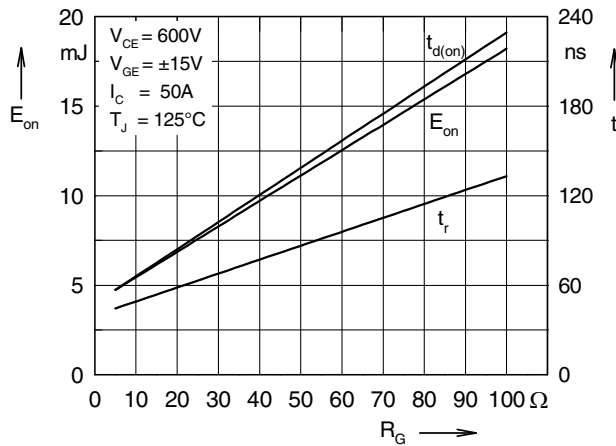


Fig. 9 Typ. turn on energy and switching times versus gate resistor

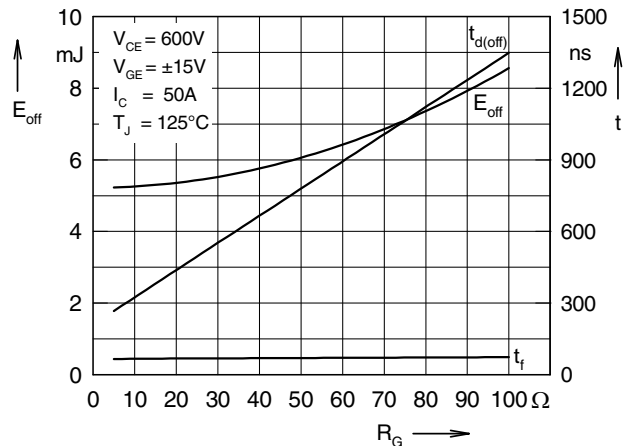


Fig.10 Typ. turn off energy and switching times versus gate resistor

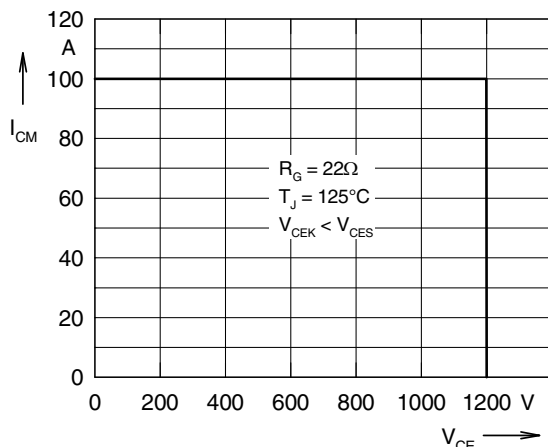


Fig. 11 Reverse biased safe operating area RBSOA

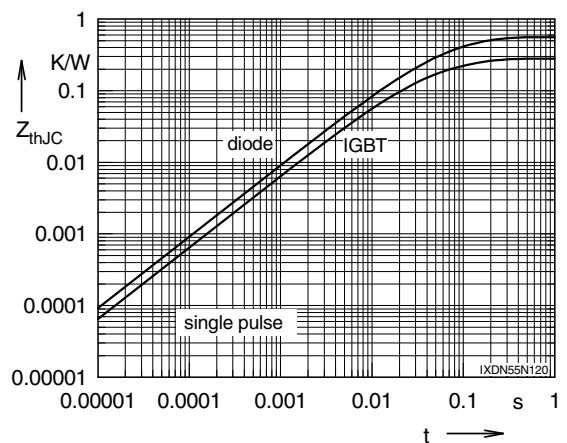


Fig. 12 Typ. transient thermal impedance