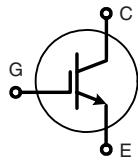


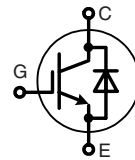
# NPT<sup>3</sup> IGBT

in miniBLOC package

$I_{C25} = 100 \text{ A}$   
 $V_{CES} = 1200 \text{ V}$   
 $V_{CE(sat) \text{ typ.}} = 2.1 \text{ V}$

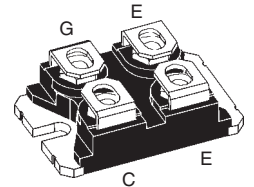


IXEN 60N120



IXEN 60N120D1

miniBLOC, SOT-227 B



C = Collector  
 G = Gate  
 E = Emitter \*

\* Either Emitter terminal can be used as Main or Kelvin Emitter

IGBT		
Symbol	Conditions	Maximum Ratings
$V_{CES}$	$T_{VJ} = 25^{\circ}\text{C to } 150^{\circ}\text{C}$	1200 V
$V_{GES}$		$\pm 20$ V
$I_{C25}$	$T_C = 25^{\circ}\text{C}$	100 A
$I_{C90}$	$T_C = 90^{\circ}\text{C}$	65 A
$I_{CM}$ $V_{CEK}$	$V_{GE} = \pm 15 \text{ V}; R_G = 22 \Omega; T_{VJ} = 125^{\circ}\text{C}$ RBSOA, Clamped inductive load; $L = 100 \mu\text{H}$	100 A
$t_{SC}$ (SCSOA)		$V_{CE} = 900 \text{ V}; V_{GE} = \pm 15 \text{ V}; R_G = 22 \Omega; T_{VJ} = 125^{\circ}\text{C}$ non-repetitive
$P_{tot}$	$T_C = 25^{\circ}\text{C}$	445 W

## Features

- NPT<sup>3</sup> IGBT
  - low saturation voltage
  - positive temperature coefficient for easy paralleling
  - fast switching
  - short tail current for optimized performance in resonant circuits
- optional HiPerFRED™ diode
  - fast reverse recovery
  - low operating forward voltage
  - low leakage current
- miniBLOC package
  - isolated copper base plate
  - screw terminals
  - kelvin emitter terminal for easy drive
  - industry standard outline

## Applications

- single switches
- choppers with complementary free wheeling diode
- phaselegs, H bridges, three phase bridges e.g. for
  - power supplies, UPS
  - AC, DC and SR drives
  - induction heating

Symbol	Conditions	Characteristic Values ( $T_{VJ} = 25^{\circ}\text{C}$ , unless otherwise specified)		
		min.	typ.	max.
$V_{CE(sat)}$	$I_C = 60 \text{ A}; V_{GE} = 15 \text{ V}; T_{VJ} = 25^{\circ}\text{C}$ $T_{VJ} = 125^{\circ}\text{C}$	2.1	2.7	V
$V_{GE(th)}$	$I_C = 2 \text{ mA}; V_{GE} = V_{CE}$	4.5		6.5 V
$I_{CES}$	$V_{CE} = V_{CES}; V_{GE} = 0 \text{ V}; T_{VJ} = 25^{\circ}\text{C}$ $T_{VJ} = 125^{\circ}\text{C}$	0.8		0.8 mA
$I_{GES}$	$V_{CE} = 0 \text{ V}; V_{GE} = \pm 20 \text{ V}$			200 nA
$t_{d(on)}$ $t_r$ $t_{d(off)}$ $t_f$	Inductive load, $T_{VJ} = 125^{\circ}\text{C}$ $V_{CE} = 600 \text{ V}; I_C = 60 \text{ A}$ $V_{GE} = \pm 15 \text{ V}; R_G = 22 \Omega$	80		ns
$E_{on}$		50		ns
$E_{off}$		680		ns
		30		ns
$C_{ies}$	$V_{CE} = 25 \text{ V}; V_{GE} = 0 \text{ V}; f = 1 \text{ MHz}$	3.8		nF
$Q_{Gon}$	$V_{CE} = 600 \text{ V}; V_{GE} = 15 \text{ V}; I_C = 50 \text{ A}$	350		nC
$R_{thJC}$			0.28	KW

Diode (D1 version only)		
Symbol	Conditions	Maximum Ratings
$I_{F25}$	$T_C = 25^\circ\text{C}$	110 A
$I_{F90}$	$T_C = 90^\circ\text{C}$	60 A

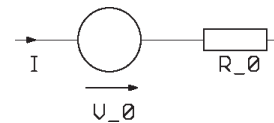
Characteristic Values ( $T_J = 25^\circ\text{C}$ , unless otherwise specified)				
Symbol	Conditions	min.	typ.	max.
$V_F$	$I_F = 60\text{ A}, V_{GE} = 0\text{ V}$	2.3	2.7	V
	$I_F = 60\text{ A}, V_{GE} = 0\text{ V}, T_J = 125^\circ\text{C}$	1.7		V
$I_{RM}$	$I_F = 60\text{ A}, -di_F/dt = 500\text{ A}/\mu\text{s}, V_R = 600\text{ V}$	41		A
$t_{rr}$	$V_{GE} = 0\text{ V}, T_J = 125^\circ\text{C}$	200		ns
$R_{thJC}$			0.6	K/W

Component		
Symbol	Conditions	Maximum Ratings
$T_{VJ}$		-40...+150 °C
$T_{stg}$		-40...+150 °C
$V_{ISOL}$	$I_{ISOL} \leq 1\text{ mA}; 50/60\text{ Hz}$	2500 V~
$M_D$	mounting torque (M4)	1.5 Nm
	terminal connection torque (M4)	1.5 Nm

Characteristic Values				
Symbol	Conditions	min.	typ.	max.
$R_{thCH}$	with heatsink compound		0.1	K/W
Weight			30	g

### Equivalent Circuits for Simulation

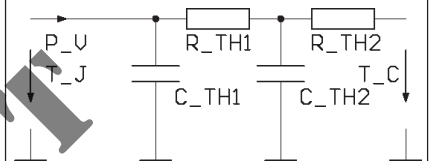
#### Conduction



IGBT (typ. at  $V_{GE} = 15\text{ V}; T_J = 125^\circ\text{C}$ )  
 $V_0 = 0.99\text{ V}; R_0 = 25\text{ m}\Omega$

Diode (typ. at  $T_J = 125^\circ\text{C}$ )  
 $V_0 = 1.3\text{ V}; R_0 = 7\text{ m}\Omega$

#### Thermal Response



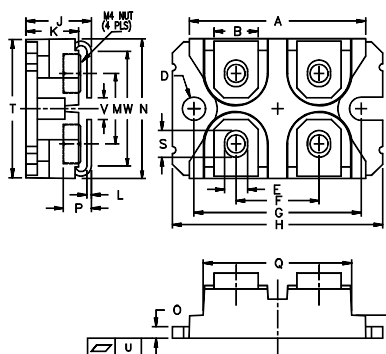
IGBT (typ.)

$C_{th1} = 0.14\text{ J/K}; R_{th1} = 0.20\text{ K/W}$   
 $C_{th2} = 0.91\text{ J/K}; R_{th2} = 0.08\text{ K/W}$

Diode (typ.)

$C_{th1} = 0.08\text{ J/K}; R_{th1} = 0.45\text{ K/W}$   
 $C_{th2} = 0.54\text{ J/K}; R_{th2} = 0.15\text{ K/W}$

### miniBLOC, SOT-227 B



M4 screws (4x) supplied

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

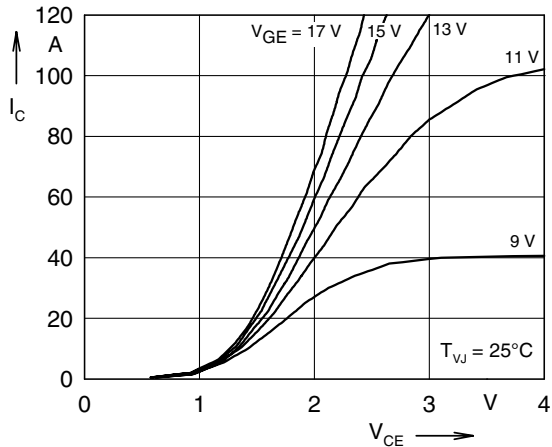


Fig. 1 Typ. output characteristics

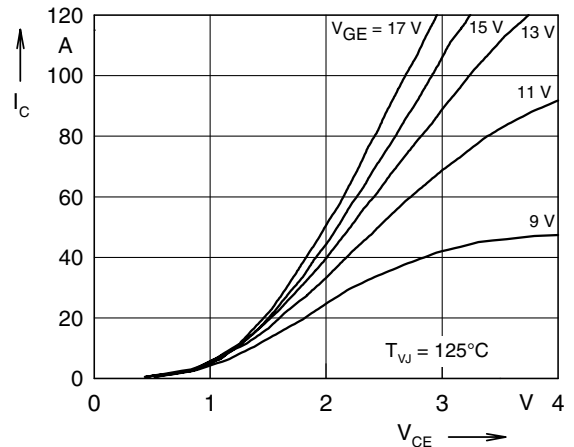


Fig. 2 Typ. output characteristics

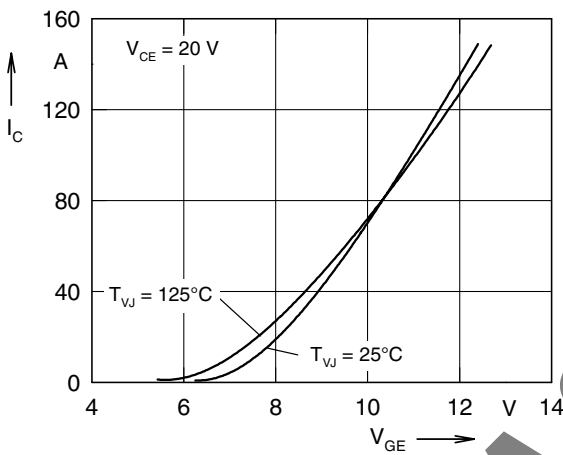


Fig. 3 Typ. transfer characteristics

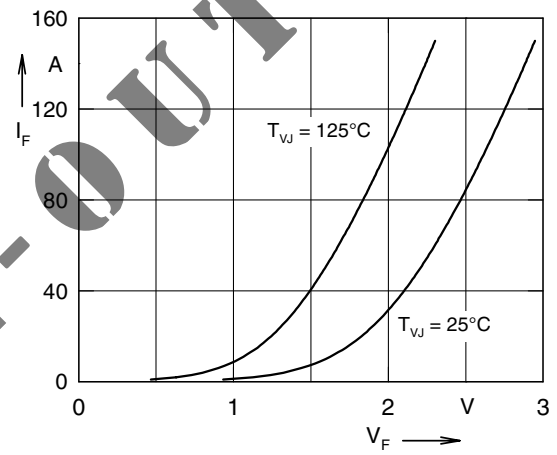


Fig. 4 Typ. forward characteristics of free wheeling diode

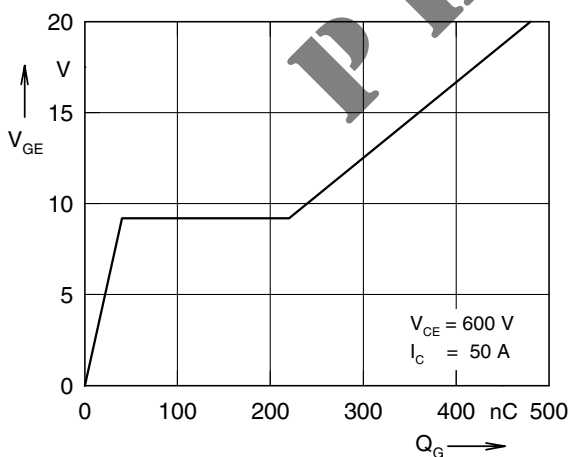


Fig. 5 Typ. turn on gate charge

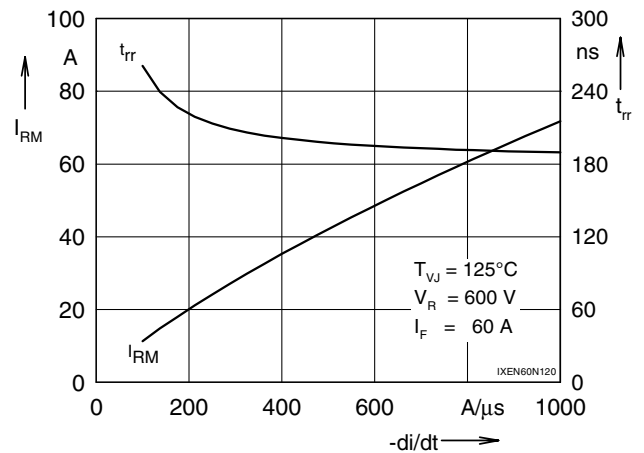


Fig. 6 Typ. turn off characteristics of free wheeling diode

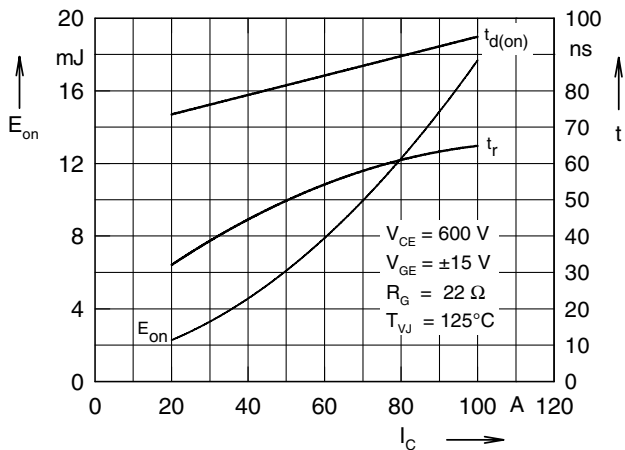


Fig. 7 Typ. turn on energy and switching times versus collector current

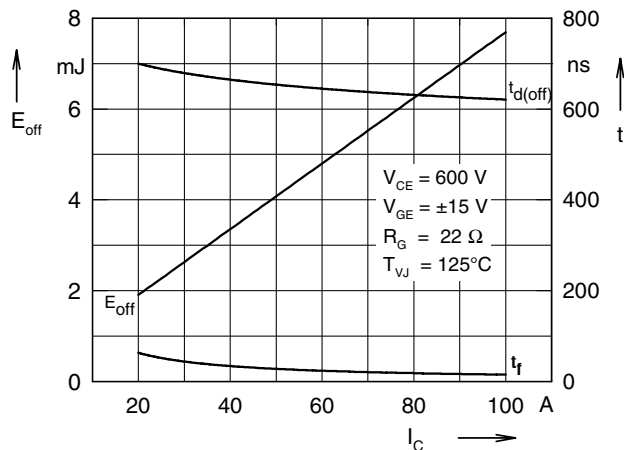


Fig. 8 Typ. turn off energy and switching times versus collector current

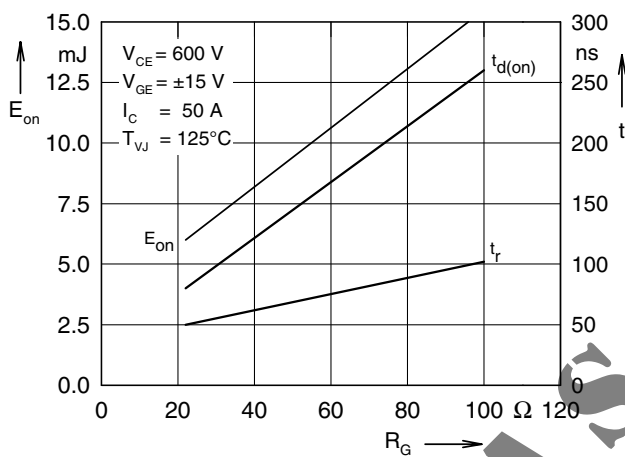


Fig. 9 Typ. turn on energy and switching times versus gate resistor

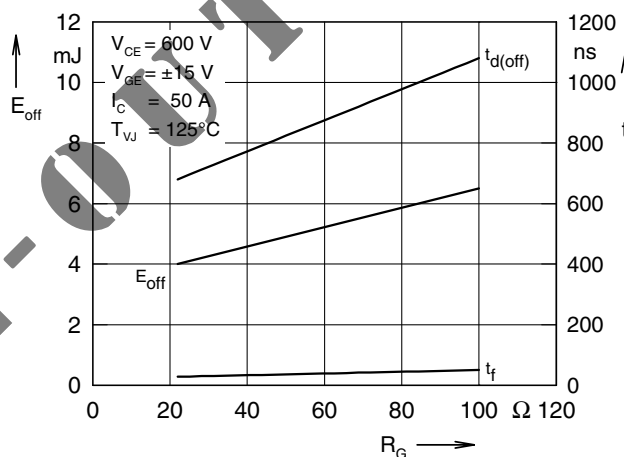


Fig. 10 Typ. turn off energy and switching times versus gate resistor

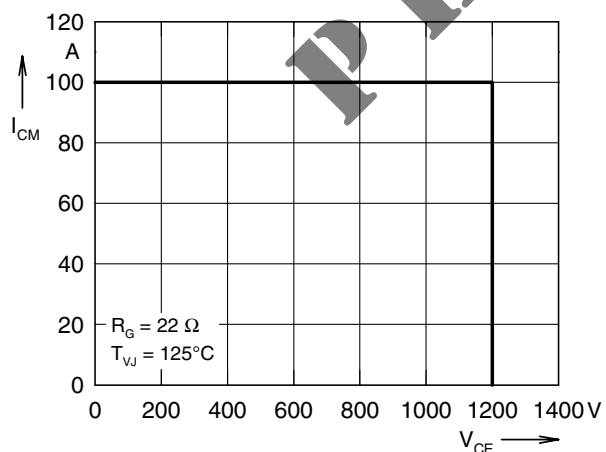


Fig. 11 Reverse biased safe operating area RBSOA

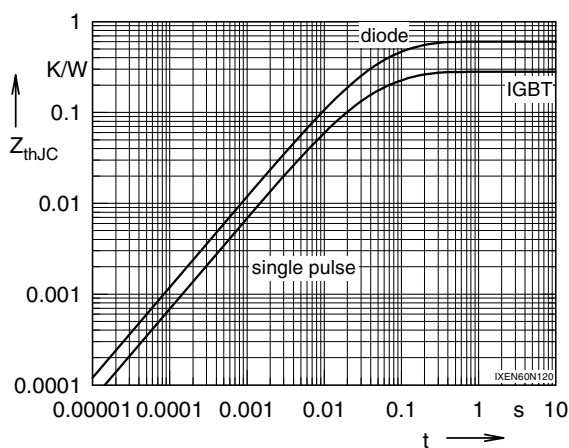


Fig. 12 Typ. transient thermal impedance