

# DOSEMI

# IGBT

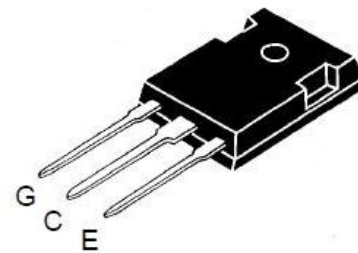
## DG30N12T2

### Molding Type Discretes

### 1200V/30A IGBT with Anti-Parallel Diode

### General Description

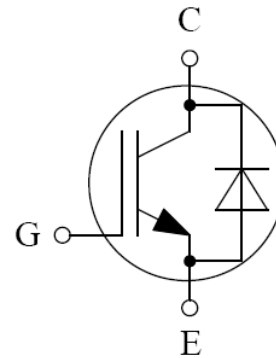
DOSEMI IGBT Power Discretes provides ultra low conduction loss as well as short circuit ruggedness. They are designed for the applications such as general inverters and electronic welders.



TO-247

### Features

- Low  $V_{CE(sat)}$  NPT IGBT technology
- Low switching loss
- Maximum junction temperature 150°C
- 10 $\mu$ s short circuit capability
- Square RBSOA
- $V_{CE(sat)}$  with positive temperature coefficient
- Fast & soft reverse recovery anti-parallel FWD
- Tight parameter distribution
- Lead free package



Equivalent Circuit Schematic

### Typical Applications

- Inverter for motor drive
- AC and DC servo drive amplifier
- Uninterruptible power supply
- Electronic welders

**Absolute Maximum Ratings**  $T_C=25^\circ\text{C}$  unless otherwise noted

Symbol	Description	DG30N12T2	Units
$V_{CES}$	Collector-Emitter Voltage	1200	V
$V_{GES}$	Gate-Emitter Voltage	$\pm 20$	V
$I_C$	Collector Current @ $T_C=25^\circ\text{C}$	58	A
	@ $T_C=100^\circ\text{C}$	30	
$I_{CM}$	Pulsed Collector Current $t_p=1\text{ms}$	60	A
$I_F$	Diode Continuous Forward Current @ $T_C=80^\circ\text{C}$	30	A
$I_{FM}$	Diode Maximum Forward Current $t_p=1\text{ms}$	60	A
$P_D$	Maximum Power Dissipation @ $T_j=150^\circ\text{C}$	568	W
$T_{jmax}$	Maximum Junction Temperature	150	$^\circ\text{C}$
$T_{jop}$	Operating Junction Temperature	-40 to +150	$^\circ\text{C}$
$T_{stg}$	Storage Temperature Range	-40 to +125	$^\circ\text{C}$
$T_S$	Soldering Temperature, 1.6mm from case for 10s	260	$^\circ\text{C}$

**Electrical Characteristics of IGBT**  $T_C=25^\circ\text{C}$  unless otherwise noted**Off Characteristics**

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Units
$V_{(BR)CES}$	Collector-Emitter Breakdown Voltage	$T_j=25^\circ\text{C}$	1200			V
$I_{CES}$	Collector Cut-Off Current	$V_{CE}=V_{CES}, V_{GE}=0\text{V},$ $T_j=25^\circ\text{C}$			25	$\mu\text{A}$
$I_{GES}$	Gate-Emitter Leakage Current	$V_{GE}=V_{GES}, V_{CE}=0\text{V},$ $T_j=25^\circ\text{C}$			100	nA

**On Characteristics**

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Units
$V_{GE(th)}$	Gate-Emitter Threshold Voltage	$I_C=250\mu\text{A}, V_{CE}=V_{GE},$ $T_j=25^\circ\text{C}$	4.8	5.6	6.3	V
$V_{CE(sat)}$	Collector to Emitter Saturation Voltage	$I_C=30\text{A}, V_{GE}=15\text{V},$ $T_j=25^\circ\text{C}$		2.30	2.75	V
		$I_C=30\text{A}, V_{GE}=15\text{V},$ $T_j=125^\circ\text{C}$		2.70		

**Switching Characteristics**

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Units
$t_{d(on)}$	Turn-On Delay Time	$V_{CC}=600V, I_C=30A,$ $R_G=33\Omega, V_{GE}=\pm 15V,$ $T_j=25^\circ C$		290		ns
$t_r$	Rise Time			63		ns
$t_{d(off)}$	Turn-Off Delay Time			270		ns
$t_f$	Fall Time			285		ns
$E_{on}$	Turn-On Switching Loss			3.82		mJ
$E_{off}$	Turn-Off Switching Loss			2.04		mJ
$t_{d(on)}$	Turn-On Delay Time	$V_{CC}=600V, I_C=30A,$ $R_G=33\Omega, V_{GE}=\pm 15V,$ $T_j=125^\circ C$		295		ns
$t_r$	Rise Time			65		ns
$t_{d(off)}$	Turn-Off Delay Time			280		ns
$t_f$	Fall Time			340		ns
$E_{on}$	Turn-On Switching Loss			4.78		mJ
$E_{off}$	Turn-Off Switching Loss			2.97		mJ
$C_{ies}$	Input Capacitance	$V_{CE}=25V, f=1MHz,$ $V_{GE}=0V$		1.68		nF
$C_{oes}$	Output Capacitance			0.26		nF
$C_{res}$	Reverse Transfer Capacitance			0.12		nF
$Q_G$	Gate Charge	$V_{CC}=400V, I_C=30A,$ $V_{GE}=15V$		210		nC
$I_{SC}$	SC Data	$t_p \leq 10\mu s, V_{GE}=15V,$ $T_j=125^\circ C, V_{CC}=900V,$ $V_{CEM} \leq 1200V$		225		A
$R_{Gint}$	Internal Gate Resistance			none		$\Omega$

**Electrical Characteristics of Diode**  $T_C=25^\circ C$  unless otherwise noted

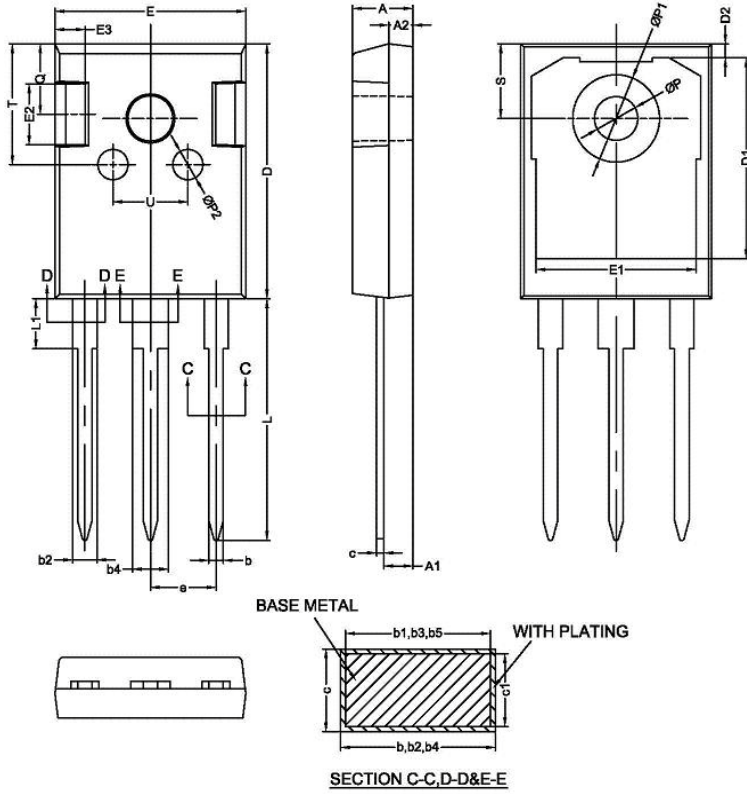
Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Units
$V_F$	Diode Forward Voltage	$I_F=30A, V_{GE}=0V$	$T_j=25^\circ C$	2.25	2.70	V
			$T_j=125^\circ C$	2.35		
$Q_r$	Recovered Charge	$I_F=30A,$ $V_R=600V,$ $R_G=33\Omega,$ $V_{GE}=-15V$	$T_j=25^\circ C$	1.8		$\mu C$
			$T_j=125^\circ C$	3.8		
$I_{RM}$	Peak Reverse Recovery Current	$V_R=600V,$ $R_G=33\Omega,$ $V_{GE}=-15V$	$T_j=25^\circ C$	25		A
			$T_j=125^\circ C$	31		
$E_{rec}$	Reverse Recovery Energy	$V_R=600V,$ $R_G=33\Omega,$ $V_{GE}=-15V$	$T_j=25^\circ C$	0.66		mJ
			$T_j=125^\circ C$	1.55		

**Thermal Characteristics**

Symbol	Parameter	Typ.	Max.	Units
$R_{\theta JC}$	Junction-to-Case (per IGBT)		0.220	K/W
$R_{\theta JC}$	Junction-to-Case (per Diode)		0.542	K/W
$R_{\theta JA}$	Junction-to-Ambient	40		K/W

Package Dimensions

Dimensions in Millimeters



COMMON DIMENSIONS  
(UNITS OF MEASURE=MILLIMETER)

SYMBOL	MIN	NOM	MAX
A	4.90	5.00	5.10
A1	2.31	2.41	2.51
A2	1.90	2.00	2.10
b	1.16	-	1.26
b1	1.15	1.2	1.22
b2	1.96	-	2.06
b3	1.95	2.00	2.02
b4	2.96	-	3.06
b5	2.95	3.00	3.02
c	0.59	-	0.66
c1	0.58	0.60	0.62
D	20.90	21.00	21.10
D1	16.25	16.55	16.85
D2	1.05	1.20	1.35
E	15.70	15.80	15.90
E1	13.10	13.30	13.50
E2	4.90	5.00	5.10
E3	2.40	2.50	2.60
e	5.44BSC		
L	19.80	19.92	20.10
L1	-	-	4.30
P	3.50	3.60	3.70
P1	-	-	7.40
P2	2.40	2.50	2.60
Q	5.60	-	6.00
S	6.15BSC		
T	9.80	-	10.20
U	6.00	-	6.40

NOTES:  
 1. ALL DIMENSIONS REFER TO JEDEC STANDARD TO-247 AD DO NOT INCLUDE MOLD FLASH OR PROTRUSIONS.  
 2. EJECTION MARK DEPTH  $0.10^{+0.15}_{-0.05}$ .

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