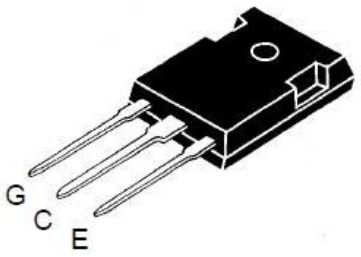
DOSEMI

IGBT

DG20N12T2

Molding Type Discretes

1200V/20A IGBT with Anti-Parallel Diode



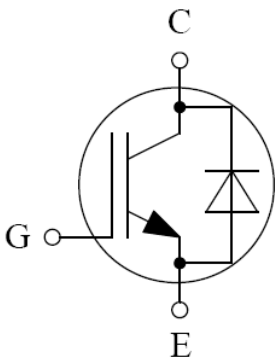
TO-247

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.

Features

- Low $V_{CE(sat)}$ NPT IGBT technology
- Low switching loss
- Maximum junction temperature 150℃
- 10μs 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℃ unless otherwise noted

Symbol	Description	DG20N12T2	Units
V_{CES}	Collector-Emitter Voltage	1200	V
V_{GES}	Gate-Emitter Voltage	±20	V
I_C	Collector Current @ T_C=25℃ @ T_C=100℃	38 20	A
I_{CM}	Pulsed Collector Current t_p=1ms	40	A
I_F	Diode Continuous Forward Current @ T_C=80℃	20	A
I_{FM}	Diode Maximum Forward Current t_p=1ms	40	A
P_D	Maximum Power Dissipation @ T_j=150℃	434	W
T_{jmax}	Maximum Junction Temperature	150	℃
T_{jop}	Operating Junction Temperature	-40 to +150	℃
T_{stg}	Storage Temperature Range	-40 to +125	℃
T_S	Soldering Temperature,1.6mm from case for 10s	260	℃

Electrical Characteristics of IGBT T_C=25℃ unless otherwise noted

Off Characteristics

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

On Characteristics

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Units
$V_{GE(th)}$	Gate-Emitter Threshold Voltage	I_C=125μA,V_{CE}=V_{GE}, T_j=25℃	4.8	5.6	6.3	V
$V_{CE(sat)}$	Collector to Emitter Saturation Voltage	I_C=20A,V_{GE}=15V, T_j=25℃		2.35	2.80	V
		I_C=20A,V_{GE}=15V, T_j=125℃		2.80		

Switching Characteristics

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Units
$t_{d(on)}$	Turn-On Delay Time	V_{CC}=600V,I_C=20A, R_G=68Ω,V_{GE}=±15V, T_j=25℃		190		ns
t_r	Rise Time			76		ns
$t_{d(off)}$	Turn-Off Delay Time			290		ns
t_f	Fall Time			395		ns
E_{on}	Turn-On Switching Loss			3.98		mJ
E_{off}	Turn-Off Switching Loss			1.30		mJ
$t_{d(on)}$	Turn-On Delay Time	V_{CC}=600V,I_C=20A, R_G=68Ω,V_{GE}=±15V, T_j=25℃		195		ns
t_r	Rise Time			76		ns
$t_{d(off)}$	Turn-Off Delay Time			310		ns
t_f	Fall Time			460		ns
E_{on}	Turn-On Switching Loss			4.44		mJ
E_{off}	Turn-Off Switching Loss			1.94		mJ
C_{ies}	Input Capacitance	V_{CE}=30V,f=1MHz, V_{GE}=0V		1.05		nF
C_{oes}	Output Capacitance			0.16		nF
C_{res}	Reverse Transfer Capacitance			0.07		nF
Q_G	Gate Charge	V_{CC}=400V,I_C=20A, V_{GE}=15V		126		nC
I_{SC}	SC Data	t_P≤10μs,V_{GE}=15V, T_j=125℃,V_{CC}=900V, V_{CEM}≤1200V		135		A
R_{Gint}	Internal Gate Resistance			none		Ω

Electrical Characteristics of Diode T_C=25℃ unless otherwise noted

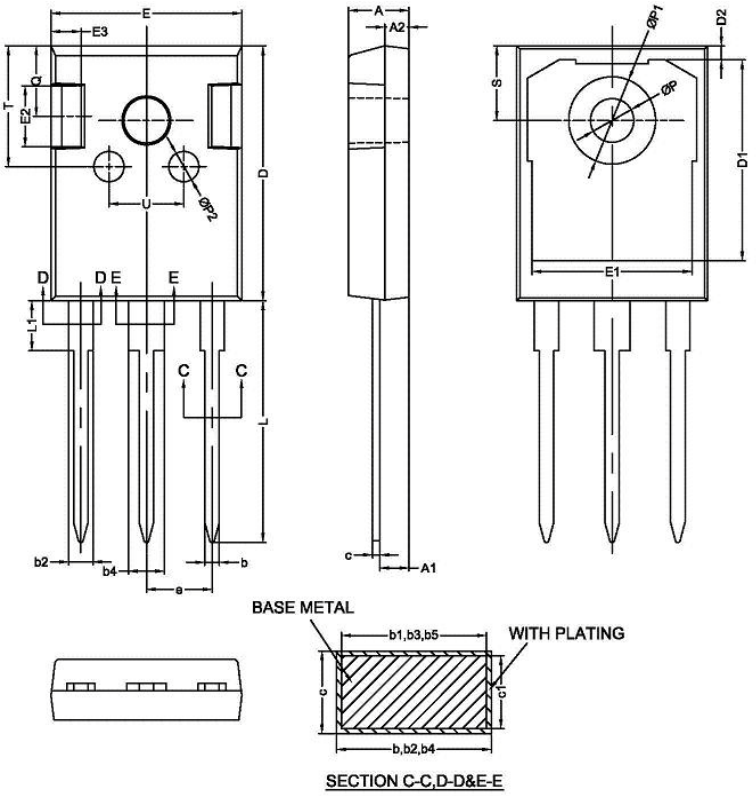
Symbol	Parameter	Test Conditions		Min.	Typ.	Max.	Units
V_F	Diode Forward Voltage	I_F=20A,V_{GE}=0V	T_j=25℃		2.45	2.90	V
			T_j=125℃		2.47		
Q_r	Recovered Charge	I_F=20A, V_R=600V, R_G=68Ω, V_{GE}=-15V	T_j=25℃		1.1		μC
			T_j=125℃		2.2		
I_{RM}	Peak Reverse Recovery Current		T_j=25℃		12		A
			T_j=125℃		15		
E_{rec}	Reverse Recovery Energy		T_j=25℃		0.49		mJ
			T_j=125℃		0.89		

Thermal Characteristics

Symbol	Parameter	Typ.	Max.	Units
$R_{θJC}$	Junction-to-Case (per IGBT)		0.288	K/W
$R_{θJC}$	Junction-to-Case (per Diode)		1.038	K/W
$R_{θJA}$	Junction-to-Ambient	40		K/W

Package Dimensions

Dimensions in Millimeters



SECTION C-C,D-D&E-E

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 $0.10^{+0.15}_{-0.05}$.

Terms and Conditions of Usage

The data contained in this product datasheet is exclusively intended for technically trained staff. you and your technical departments will have to evaluate the suitability of the product for the intended application and the completeness of the product data with respect to such application.

This product data sheet is describing the characteristics of this product for which a warranty is granted. Any such warranty is granted exclusively pursuant the terms and conditions of the supply agreement. There will be no guarantee of any kind for the product and its characteristics.

Should you require product information in excess of the data given in this product data sheet or which concerns the specific application of our product, please contact the sales office, which is responsible for you, For those that are specifically interested we may provide application notes.

Due to technical requirements our product may contain dangerous substances. For information on the types in question please contact the sales office, which is responsible for you.

Should you intend to use the Product in aviation applications, in health or live endangering or life support applications, please notify.

If and to the extent necessary, please forward equivalent notices to your customers.
Changes of this product data sheet are reserved.