

General Description

Using First proprietary Trench design and advanced NPT technology, the 1200V NPT IGBT offers superior conduction and switching performances, high avalanche ruggedness and sweasy parallel operation.

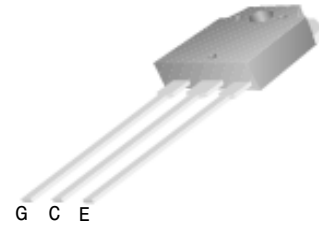
Features

- NPT Trench Technology, Positive temperature coefficient
- Low saturation voltage: $V_{CE(sat)}$, typ = 2.0V
@ $I_C = 25A$ and $T_C = 25^\circ C$
- Extremely enhanced avalanche capability

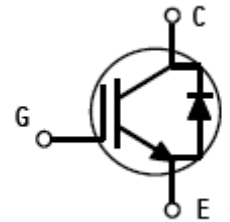
Application

- Power switch circuit of induction cooker(IH).

PIN Connection TO-3P/TO-247AD



V_{CES}	1200	V
I_C	25	A
P_{tot} $T_C=25^\circ C$	320	W
$V_{CE(SAT)}$	2.0	V



Marking Diagram



- Y = Year
- A = Assembly Location
- WW = Work Week
- FIGB25N120TD = Specific Device Code

Absolute Maximum Ratings (TA=25°C unless otherwise specified)

Symbol	Parameter	Rating	Units
V_{CES}	Collector-Emitter Voltage	1200	V
V_{GES}	Gate- Emitter Voltage	± 20	V
I_C	Collector Current	50	A
	Collector Current @TC = 100 °C	25	A
I_{CM}^{al}	Pulsed Collector Current	75	A
I_F	Diode Continuous Forward Current @TC = 100 °C	25	A
I_{FM}	Diode Maximum Forward Current	150	A
P_D	Power Dissipation @ TC = 25°C	320	W
	Power Dissipation @TC = 100 °C	130	W
T_J, T_{stg}	Operating Junction and Storage Temperature Range	-55 to +150	°C
T_L	Maximum Temperature for Soldering	300	°C

Thermal Characteristics

Symbol	Parameter	Typ.	Max.	Units
$R_{\theta JC}$	Thermal Resistance, Junction to case for IGBT	--	0.67	$^{\circ}\text{C}/\text{W}$
$R_{\theta JC}$	Thermal Resistance, Junction to case for Diode	--	2.88	$^{\circ}\text{C}/\text{W}$
$R_{\theta JA}$	Thermal Resistance, Junction to Ambient	--	40	$^{\circ}\text{C}/\text{W}$

Electrical Characteristics of the IGBT ($T_c=25^{\circ}\text{C}$ unless otherwise specified)
OFF Characteristics

Symbol	Parameter	Test Conditions	Rating			Units
			Min.	Typ.	Max.	
V_{CES}	Collector-Emitter Breakdown Voltage	$V_{GE}=0\text{V}, I_{CE}=1\text{mA}$	1200	--	--	V
I_{CES}	Collector-Emitter Leakage Current	$V_{GE}=0\text{V}, V_{CE}=V_{CES}$	--	--	1.0	mA
$I_{GES(F)}$	Gate to Emitter Forward Leakage	$V_{GE}=+20\text{V}$	--	--	+250	nA
$I_{GES(R)}$	Gate to Source Reverse Leakage	$V_{GE}=-20\text{V}$	--	--	-250	nA

ON Characteristics

Symbol	Parameter	Test Conditions	Rating			Units
			Min.	Typ.	Max.	
$V_{CE(sat)}$	Collector-Emitter Saturation Voltage	$I_C=25\text{A}, V_{GE}=15\text{V}$	--	2.0	2.5	V
$V_{GE(TH)}$	Gate Threshold Voltage	$I_C=250\mu\text{A}, V_{CE}=V_{ge}$	3.5	4.2	7.5	V

 Pulse width $t_p \leq 380\mu\text{s}, \delta \leq 2\%$
Dynamic Characteristics

Symbol	Parameter	Test Conditions	Rating			Units
			Min.	Typ.	Max.	
C_{ies}	Input Capacitance	$V_{CE}=25\text{V}, V_{GE}=0\text{V}$ $f=1\text{MHz}$	--	7360	--	pF
C_{oes}	Output Capacitance		--	170	--	
C_{res}	Reverse Transfer Capacitance		--	125	--	

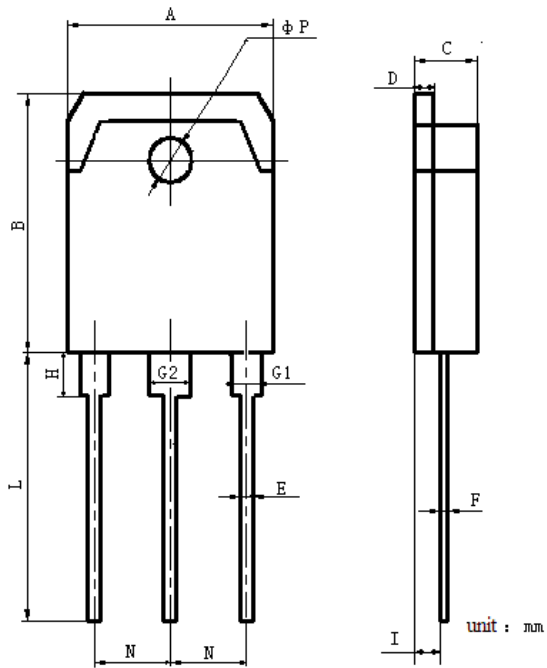
Resistive Switching Characteristics

Symbol	Parameter	Test Conditions	Rating			Units	
			Min.	Typ.	Max.		
$t_{d(ON)}$	Turn-on Delay Time	$V_{CE}=600\text{V}, I_C=25\text{A}$ $V_{GE}=15\text{V}, R_g=10\Omega$ Inductive Load	--	58	--	ns	
t_r	Rise Time		--	50	--		
$t_{d(OFF)}$	Turn-Off Delay Time		--	380	--		
t_f	Fall Time		--	60	--		
E_{on}	Turn-On Switching Loss		Inductive Load	--	1.39	2.1	mJ
E_{off}	Turn-Off Switching Loss			--	0.78	1.2	
E_{ts}	Total Switching Loss			--	2.17	3.3	
Q_g	Total Gate Charge	$V_{CE}=600\text{V}, I_C=25\text{A}$ $V_{GE}=15\text{V}$	--	188	290	nC	
Q_{ge}	Gate to Emitter Charge		--	18	28		
Q_{gc}	Gate to Collector Charge		--	65	100		

Electrical Characteristics of the DIODE (Tc=25°C unless otherwise specified)

Symbol	Parameter	Test Conditions	Rating			Units
			Min.	Typ.	Max.	
V _{FM}	Diode Forward Voltage	I _F =25A	--	1.3	2.7	V
T _{rr}	Reverse Recovery Time	I _F =25A di/dt=200A/uS	--	370	585	ns
I _{rr}	Diode Peak Reverse Recovery Current		--	53	85	A
Q _{rr}	Reverse Recovery Charge		--	10	15	uC
Pulse width t _p ≤ 380μs, δ ≤ 2%						

^{a1}: Repetitive rating; pulse width limited by maximum junction temperature

Package Dimensions
TO-3P/TO-247AD


Parameter	Rating(mm)	
	MIN	MAX
A	15.10	15.90
B	19.50	20.50
C	4.70	4.90
D	1.40	1.60
E	0.90	1.10
F	0.50	0.70
G1	2.00	2.20
G2	3.00	3.20
H	3.00	3.60
I	2.70	2.90
L	19.5	20.9
N	5.25	5.65
ϕP	3.10	3.30