

High Voltage IGBT Phase-Leg

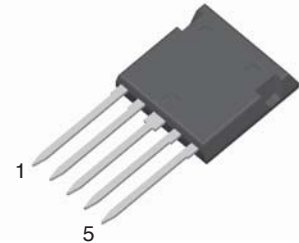
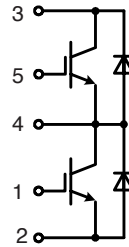
FII24N170AH1

$$I_{C25} = 18 \text{ A}$$

$$V_{CES} = 1700 \text{ V}$$

$$V_{CE(sat)} = 6.0 \text{ V}$$

ISOPLUS i4-PAC™ Package



IGBT

Symbol	Conditions	Maximum Ratings	
V_{CES}	$T_{VJ} = 25^{\circ}\text{C to } 150^{\circ}\text{C}$	1700	V
V_{GES}	Continuous	± 20	V
V_{GEM}	Transient	± 30	V
I_{C25}	$T_C = 25^{\circ}\text{C}$	18	A
I_{C90}	$T_C = 90^{\circ}\text{C}$	11	A
I_{CM}		75	A
RBSOA	$V_{GE} = +15 \text{ V}; R_G = 5 \Omega; T_{VJ} = 125^{\circ}\text{C}$ Clamped inductive load; $V_{clamp} = 1360\text{V}$	50	A
P_C	$T_C = 25^{\circ}\text{C}$	140	W

Features

- NPT³ IGBT
 - low saturation voltage
 - positive temperature coefficient for easy paralleling
 - fast switching
 - short tail current for optimized performance in resonant circuits
- SONIC-FRD™ diode
 - fast reverse recovery
 - low operating forward voltage
 - low leakage current
- ISOPLUS i4-PAC™ package
 - isolated back surface
 - low coupling capacity between pins and heatsink
 - enlarged creepage towards heatsink
 - application friendly pinout
 - low inductive current path
 - high reliability
 - industry standard outline
 - UL registered, E 72873

Applications

- Single phaseleg
 - buck-boost chopper
- H-bridge
 - power supplies
 - induction heating
 - four quadrant DC drives
 - controlled rectifier
- Three phase bridge
 - AC drives
 - controlled rectifier

Symbol	Conditions	Characteristic Values ($T_{VJ} = 25^{\circ}\text{C}$ unless otherwise specified)		
		min.	typ.	max.
$V_{CE(sat)}$	$I_C = 16 \text{ A}; V_{GE} = 15 \text{ V}$ $T_{VJ} = 125^{\circ}\text{C}$		4.5 4.8	6.0 V
$V_{GE(th)}$	$I_C = 250 \mu\text{A}; V_{GE} = V_{CE}$	3.0		5.0 V
I_{CES}	$V_{CE} = 0.8 V_{CES}; V_{GE} = 0 \text{ V}$ $T_{VJ} = 125^{\circ}\text{C}$			100 μA 1.5 mA
I_{GES}	$V_{CE} = 0 \text{ V}; V_{GE} = \pm 20 \text{ V}$			$\pm 100 \text{ nA}$
$t_{d(on)}$	Inductive load $V_{CE} = 600 \text{ V}; I_C = 24 \text{ A}$ $V_{GE} = \pm 15 \text{ V}; R_G = 39 \Omega$		48	ns
t_r			60	ns
$t_{d(off)}$			200	ns
t_f			45	ns
E_{off}			1.1	mJ
$t_{d(on)}$	Inductive load, $T_{VJ} = 125^{\circ}\text{C}$		40	ns
t_r			60	ns
$t_{d(off)}$			220	ns
t_f			55	ns
E_{on}			2.5	mJ
E_{off}			1.7	mJ

Note: All characteristic values and ratings refer to a single IGBT or diode except V_{CES} , I_{CES} and C_{oes} .

IGBT

Symbol	Conditions	Characteristic Values		
		min.	typ.	max.
g_{fs}	$I_C = 24 \text{ A}$, $V_{CE} = 10 \text{ V}$, Note 2	10	16	S
Q_g	$I_C = 16 \text{ A}$, $V_{GE} = 15 \text{ V}$, $V_{CE} = 0.5 V_{CES}$		105	nC
Q_{ge}			17	nC
Q_{gc}			30	nC
C_{ies}	$V_{CE} = 25 \text{ V}$, $V_{GE} = 0 \text{ V}$, $f = 1 \text{ MHz}$		2400	pF
C_{oes}			150	pF
C_{res}			30	pF
R_{thJC} R_{thCK}		0.6	0.9	K/W K/W

Diode

Symbol	Conditions	Maximum Ratings	
I_{F25}	$T_C = 25^\circ\text{C}$	24	A
I_{F90}	$T_C = 90^\circ\text{C}$	14	A

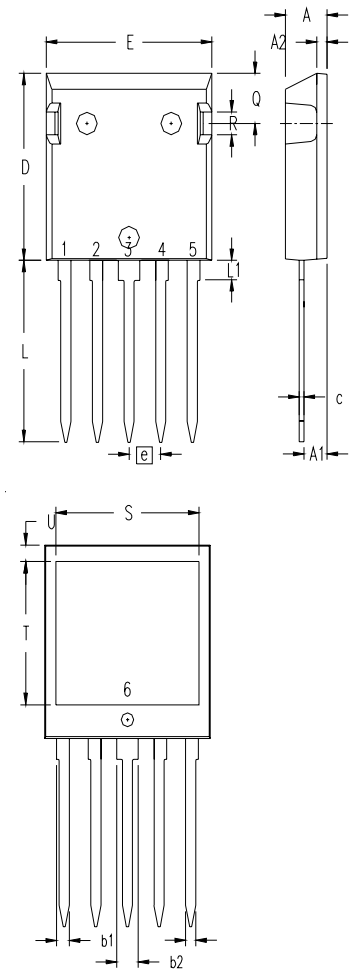
Symbol	Conditions	Characteristic Values		
		min.	typ.	max.
V_F	$I_F = 20 \text{ A}$ $T_{VJ} = 125^\circ\text{C}$		2.5	2.95
			2.5	V
I_{RM}	$I_F = 20 \text{ A}$; $di_F/dt = -450 \text{ A}/\mu\text{s}$; $T_{VJ} = 125^\circ\text{C}$		23	A
t_{rr}	$V_R = 1200 \text{ V}$; $V_{GE} = 0 \text{ V}$		230	ns
R_{thJC}		1.6		K/W
R_{thCS}		0.6		K/W

Component

Symbol	Conditions	Maximum Ratings	
T_{VJ}		-55...+150	$^\circ\text{C}$
T_{stg}		-55...+125	$^\circ\text{C}$
V_{ISOL}	$I_{ISOL} \leq 1 \text{ mA}$; 50/60 Hz	2500	V~
F_C	mounting force with clip	20...120	N

Symbol	Conditions	Characteristic Values		
		min.	typ.	max.
C_p	coupling capacity between shorted pins and mounting tab in the case		40	pF
$d_{S^*}d_A$	pin - pin	1.7		mm
$d_{S^*}d_A$	pin - backside metal	5.5		mm
Weight			9	g

Outline Drawing



SYM	INCHES		MILLIMETERS	
	MIN	MAX	MIN	MAX
A	.190	.205	4.83	5.21
A1	.102	.118	2.59	3.00
A2	.046	.085	1.17	2.16
b	.045	.055	1.14	1.40
b1	.058	.068	1.47	1.73
b2	.100	.110	2.54	2.79
C	.020	.029	0.51	0.74
D	.819	.840	20.80	21.34
E	.770	.799	19.56	20.29
e	.150 BSC		3.81 BSC	
L	.780	.840	19.81	21.34
L1	.083	.102	2.11	2.59
Q	.210	.244	5.33	6.20
R	.100	.180	2.54	4.57
S	.660	.690	16.76	17.53
T	.590	.620	14.99	15.75
U	.065	.080	1.65	2.03

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