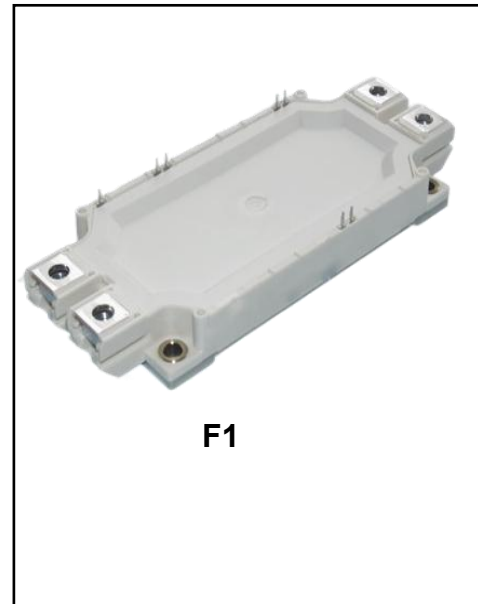


F1 PACK with Trench/Fieldstop IGBT and Emitter Controlled diode and Press FIT/NTC

Features

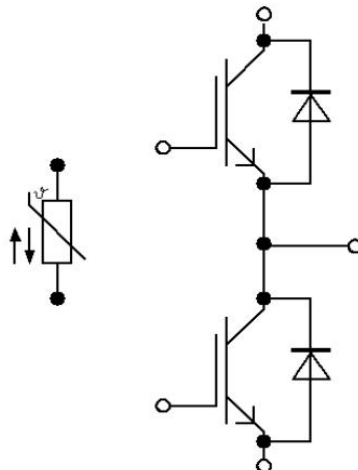
- Electrical features
 - Low V_{CEsat}
 - $T_{vjop}=150^{\circ}C$
 - V_{CEsat} with positive Temperature Coefficient
- Mechanical features
 - High Power and Thermal Cycling Capability
 - High Power Density
 - Isolated Base Plate
 - PressFIT Contact Technology



Typical Applications

- Inverter and power supplies
- Motor Drives
- Servo Drives
- Photovoltaic/Fuel cell

Description



Package Insulation coordination

Symbol	Description	Note or test condition	Values	Unit
V_{ISOL}	Isolation test voltage	RMS, f=50Hz, t=60s	3	kV
	Material of module baseplate		Cu	
	Internal isolation	basic insulation(class 1, IEC 61140)	Al_2O_3	
d_{creep}	Creepage distance	terminal to heatsink	14.5	mm
d_{creep}	Creepage distance	terminal to terminal	13.0	mm
d_{clear}	Clearance	terminal to heatsink	12.5	mm
d_{clear}	Clearance	terminal to terminal	10.0	mm
CTI	Comparative tracking index (electrical)		>500	

Package Characteristic values

Symbol	Description	Note or test condition		Values			Unit
				Min.	Typ.	Max.	
L_{sCE}	Stray inductance module				20		nH
$R_{CC'+EE'}$	Module lead resistance, terminals - chip	TC = 25 °C, per switch			1.1		mΩ
T_{STG}	Storage Temperature Range			-40		125	°C
M	Mounting torque for module mounting	-Mounting according to valid application note	M5, Screw	3.0	--	6.0	Nm
M	Terminal connection torque	-Mounting according to valid application note	M6, Screw	3.0	--	6.0	Nm
G	Weight			--	350	--	g

IGBT

Absolute Maximum Ratings (T_c = 25°C unless otherwise noted)

Symbol	Description	Value	Unit
V _{CES}	Collector-Emitter Voltage	1200	V
V _{GES}	Gate-Emitter Voltage	±30	V
I _{CDC}	Continuous Collector Current @ T _c = 80°C (T _{JMAX} = 175°C)	650	A
I _{CM}	Pulsed Collector Current, t _p limited by T _{vj max}	1200	A

Characteristics (T_c = 25°C unless otherwise noted)

Symbol	Parameter	Test Condition		Min	Typ	Max	Unit
V _{CE(sat)}	Collector–Emitter Saturation Voltage	I _C =450A, V _{GE} = 15 V	T _{vj} = 25 °C	--	1.40	2.40	V
			T _{vj} = 150 °C	--	1.60	--	
V _{CE(sat)}	Collector–Emitter Saturation Voltage	I _C =650A, V _{GE} = 15 V	T _{vj} = 25 °C	--	1.60	2.60	V
			T _{vj} = 150 °C	--	1.80	--	
V _{GE(TH)}	Gate–Emitter Threshold Voltage	V _{GE} = V _{CE} , I _C = 5 mA, T _{vj} = 25°C		5.0	6.0	7.0	V
I _{CES}	Collector–Emitter Cutoff Current	V _{GE} = 0 V, V _{CE} =1200V, T _{vj} = 25°C		--	--	1.0	mA
I _{GES}	Gate-Emitter Leakage Current	V _{GE} = ±30 V, V _{CE} = 0 V, T _{vj} = 25°C		--	--	±200	nA
R _{Gint}	Internal Gate Resistance	T _{vj} = 25 °C		--	0.8	--	Ω
C _{ies}	Input Capacitance	f = 100 kHz, T _{vj} = 25 °C, V _{CE} = 25 V, V _{GE} = 0 V		--	96.34	--	nF
C _{res}	Reverse Transfer			--	0.48	--	nF
Q _G	Gate Charge	V _{GE} = ±15 V, V _{CC} = 960 V		--	3.32	--	μC
t _{d(on)}	Turn–On Delay Time	I _C = 600A, V _{CC} = 600 V, V _{GE} = 15 /-5V, R _G = 5.0 Ω	T _{vj} = 25 °C	--	138	--	ns
			T _{vj} = 150 °C	--	157	--	
t _r	Rise Time	I _C =600A, V _{CC} = 600 V, V _{GE} = 15 /-5V, R _G = 5.0 Ω	T _{vj} = 25 °C	--	25	--	ns
			T _{vj} = 150 °C	--	30	--	
t _{d(off)}	Turn–off Delay Time	I _C = 600A, V _{CC} = 600 V, V _{GE} = 15 /-5V, R _{Goff} = 5.0 Ω	T _{vj} = 25 °C	--	281	--	ns
			T _{vj} = 150 °C	--	321	--	
t _f	Fall Time	I _C = 600A, V _{CC} = 600 V, V _{GE} = 15 /-5V, R _G = 5.0 Ω	T _{vj} = 25 °C	--	34	--	ns
			T _{vj} = 150 °C	--	76	--	
E _{on}	Turn–On Switching Loss per Pulse	I _C =600A, V _{CC} = 600 V, V _{GE} = 15 /-5V, R _G = 5.0 Ω (T _{vj max} = 175 °C)	T _{vj} = 25 °C	--	6.53	--	mJ
			T _{vj} = 150 °C	--	13.02	--	
E _{off}	Turn Off Switching Loss per Pulse	I _C = 225A, V _{CC} = 600 V, V _{GE} = 15 /-5V, R _G = 5.0 Ω (T _{vj max} = 175 °C)	T _{vj} = 25 °C	--	28.38	--	mJ
			T _{vj} = 150 °C	--	37.8	--	
I _{SC}	SC Data	V _{GE} ≤ 15 V, V _{CC} = 800 V, V _{CEmax} =V _{CES} -L _{sCE} .di/dt	t _p ≤ 10 μs, T _{vj} =150 °C	--	2000	--	A
R _{thJC}	Thermal resistance	Junction-to-Case (per IGBT)		--	0.052		K/W
T _{vj op}		Temperature under switching conditions		-40		175 ¹⁾	°C

¹⁾T_{vj op} > 150°C is only allowed for operation at overload conditions.

Diodes

Absolute Maximum Ratings (T_c = 25°C unless otherwise noted)

Symbol	Description	Value	Unit
V _{RRM}	Repetitive Peak Reverse Voltage	1200	V
I _F	Diode Continuous Forward Current @ T _c =80°C	650	A
I _{FRM}	Diode Maximum Forward Current t _p =1ms	1200	A

Characteristics (T_c=25°C unless otherwise noted)

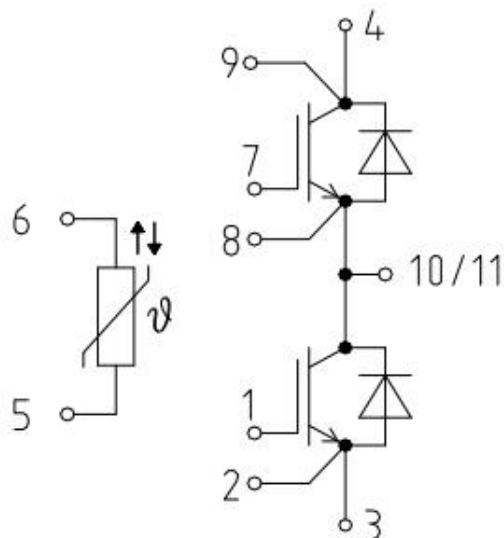
Symbol	Parameter	Note or Test Condition	Min	Typ	Max	Unit
V _F	Diode Forward Voltage	I _F = 450 A	T _{vj} = 25 °C	--	1.60	V
			T _{vj} = 150 °C	--	1.50	
V _F	Diode Forward Voltage	I _F = 650 A	T _{vj} = 25 °C	--	1.80	V
			T _{vj} = 150 °C	--	1.70	
Q _r	Recovered Charge	I _F = 600 A, V _R = 600 V, R _G = 5.0 Ω (T _{vj max} = 175 °C)	T _{vj} = 25 °C	--	8.528	μC
			T _{vj} = 150 °C	--	26.52	
I _{RM}	Peak Reverse Recovery Current	I _F = 600 A, V _R = 600 V, R _G = 5.0 Ω (T _{vj max} = 175 °C)	T _{vj} = 25 °C	--	111.2	A
			T _{vj} = 150 °C	--	159.2	
E _{rec}	Reverse recovery energy	I _F = 600 A, V _R = 600 V, R _G = 5.0 Ω (T _{vj max} = 175 °C)	T _{vj} = 25 °C	--	7.88	mJ
			T _{vj} = 150 °C	--	19.504	
R _{thJC}	Thermal resistance, junction to case	per diode	--	0.08	--	K/W
T _{vj op}		Temperature under switching conditions	-40		175 ²⁾	°C

²⁾T_{vj op} >150°C is only allowed for operation at overload conditions.

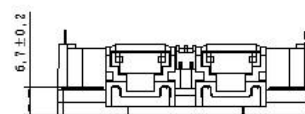
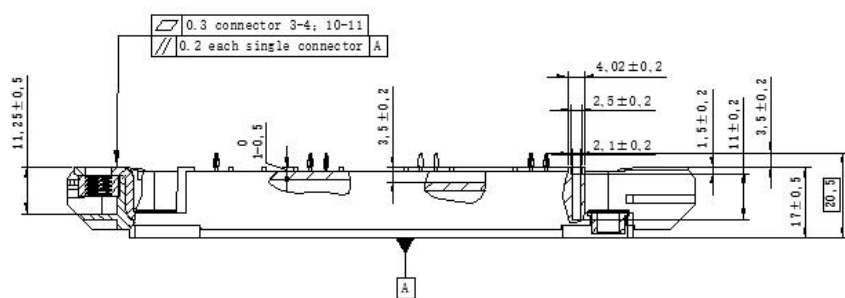
NTC Characteristics (T_c = 25°C unless otherwise noted)

Symbol	Parameter	Test Condition	Min	Typ	Max	Unit
R ₂₅	Rated Resistance		--	5.0	--	kΩ
ΔR/R	Deviation of R100	T _c =100 °C, R ₁₀₀ =493.3Ω	-5	--	5	%
P ₂₅	Power Dissipation		--	--	20.0	mW
B _{25/50}	B-value	R ₂ =R ₂₅ exp[B _{25/50} (1/T ₂ - 1/(298.15K))]	--	3375	--	K
B _{25/80}	B-value	R ₂ =R ₂₅ exp[B _{25/80} (1/T ₂ - 1/(298.15K))]	--	3411	--	K
B _{25/100}	B-value	R ₂ =R ₂₅ exp[B _{25/100} (1/T ₂ - 1/(298.15K))]	--	3433	--	K

CIRCUIT DIAGRAM

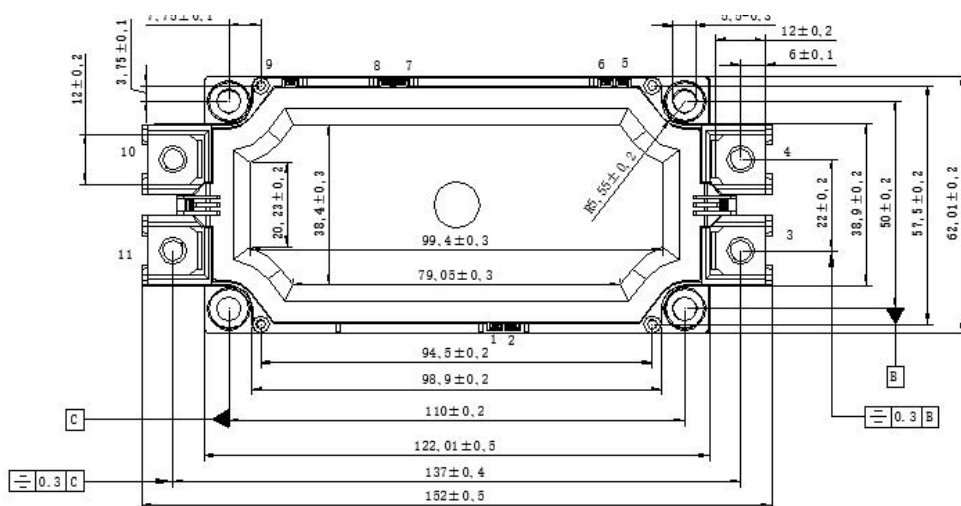


PACKAGE DIMENSION



SIDE VIEW

SIDE VIEW



TOP VIEW

