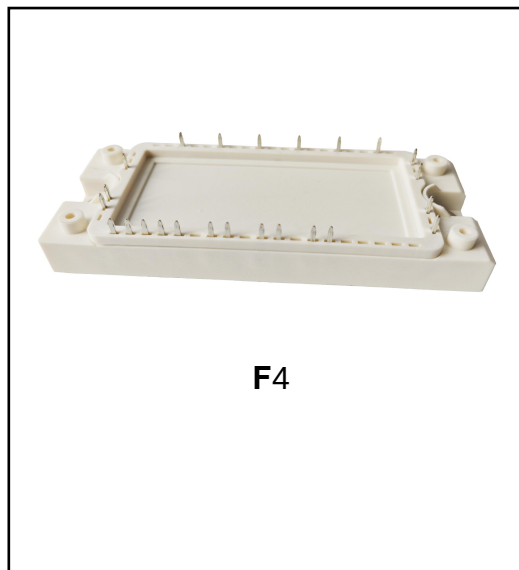


F4 PACK module with Gen.7 Trench/Fieldstop IGBT and Emitter Controlled diode and NTC

Features

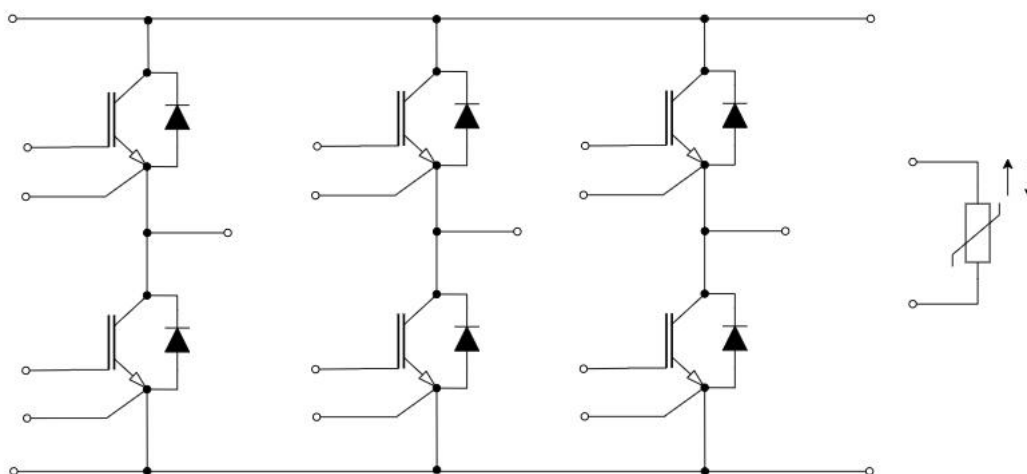
- Low $V_{CE(sat)}$ Trench IGBT technology
- 10 μ s short circuit capability
- $V_{CE(sat)}$ with positive temperature coefficient
- Overload operation up to 175°C
- Low inductance case
- Copper Base Plate
- Integrated NTC temperature sensor



Typical Applications

- Motor Drives

Description



Package Insulation coordination

Parameter	Symbol	Note or test condition	Values	Unit
Isolation test voltage	V_{ISOL}	RMS, f=50Hz, t=60s	2.5	kV
Internal isolation		basic insulation(class 1, IEC 61140)	Al_2O_3	
Creepage distance	d_{creep}	terminal to heatsink	10.0	mm
Clearance	d_{clear}	terminal to heatsink	7.5	mm
Comparative tracking index (electrical)	CTI		>200	
RTI Elec.	RTI	housing	140	°C

Package Characteristic values

Parameter	Symbol	Note or test condition	Values			Unit
			Min.	Typ.	Max.	
Stray Inductance	LCE		--	19	--	nH
Module Lead Resistance, Terminal to Chip	$R_{CC'+EE'}$	$T_c=25^{\circ}C$, per switch	--	1.80	--	mΩ
Storage Temperature Range	T_{STG}		-40		125	°C
Mounting Torque, Screw M5	M	M5, Screw	3		6	N.m
Weight	G		--	180	--	g

IGBT, Inverter

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

Symbol	Description	Value	Unit
V _{CES}	Collector-Emitter Voltage	650	V
V _{GES}	Gate-Emitter Voltage	±30	V
I _C	Collector Current @ T _C =25°C	200	A
	Collector Current @ T _C =80°C	100	A
I _{CM}	Pulsed Collector Current, t _p =1S	300	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 =100A, V _{GE} =15V	T _{vj} =25°C	--	1.20	V
			T _{vj} = 150°C	--	1.40	
V _{GE(th)}	Gate Threshold Voltage	I _C =3mA, V _{CE} =V _{GE}	4.5	5.75	6.5	V
I _{CES}	Collector-Emitter Leakage Current	V _{GE} =0V, V _{CE} =650V	--	--	500	uA
I _{GES}	Gate-Emitter Leakage Current	V _{GE} =30V, V _{CE} =0V	--	--	±100	nA
R _{Gint}	Internal Gate Resistance	f=1MHz	--	0.8	--	Ω
C _{ies}	Input Capacitance	V _{CE} =25V, V _{GE} =0V, f=1MHz	--	7.25	--	nF
C _{oes}	Out Capacitance		--	0.32	--	nF
C _{res}	Reverse Transfer		--	0.048	--	nF
Q _G	Gate Charge	V _{CE} =400V, I _C =100A, V _{GE} =15V	--	0.27	--	μC
t _{d(on)}	Turn-On Delay Time	V _{CE} =400V, I _C =100A, V _{GE} =0/15V, R _g =25Ω, Inductive Load	--	107	--	ns
t _r	Rise Time		--	70	--	
t _{d(off)}	Turn-off Delay Time		--	294	--	
t _f	Fall Time		--	52	--	
E _{on}	Turn-On Switching Loss per Pulse		--	8.52	--	mJ
E _{off}	Turn Off Switching Loss per Pulse		--	6.00	--	
t _{d(on)}	Turn-On Delay Time	V _{CE} =400V, I _C =100A, V _{GE} =0/15V, R _g =25Ω, Inductive Load, T _j =175°C	--	TBD	--	ns
t _r	Rise Time		--	TBD	--	
t _{d(off)}	Turn-off Delay Time		--	TBD	--	
t _f	Fall Time		--	TBD	--	
E _{on}	Turn-on Switching Loss per Pulse		--	10.92	--	mJ
E _{off}	Turn Off Switching Loss per Pulse		--	6.64	--	
I _{SC}	SC Data	V _{GE} =15V, V _{CC} ≤600V, t _{SC} ≤10us, T _j ≤150°C	--	500	--	A
R _{thJC}	Thermal resistance	Junction-to-Case (per IGBT)		0.48		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. For detailed specifications please refer to AN 2018-14.

Diode, Inverter

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

Symbol	Description	Value	Unit
V _{RRM}	Repetitive Peak Reverse Voltage	650	V
I _F	Diode Continuous Forward Current	100	A
I _{FM}	Diode Maximum Forward Current t _p =1ms	200	A

Characteristics (T_C=25°C unless otherwise noted)

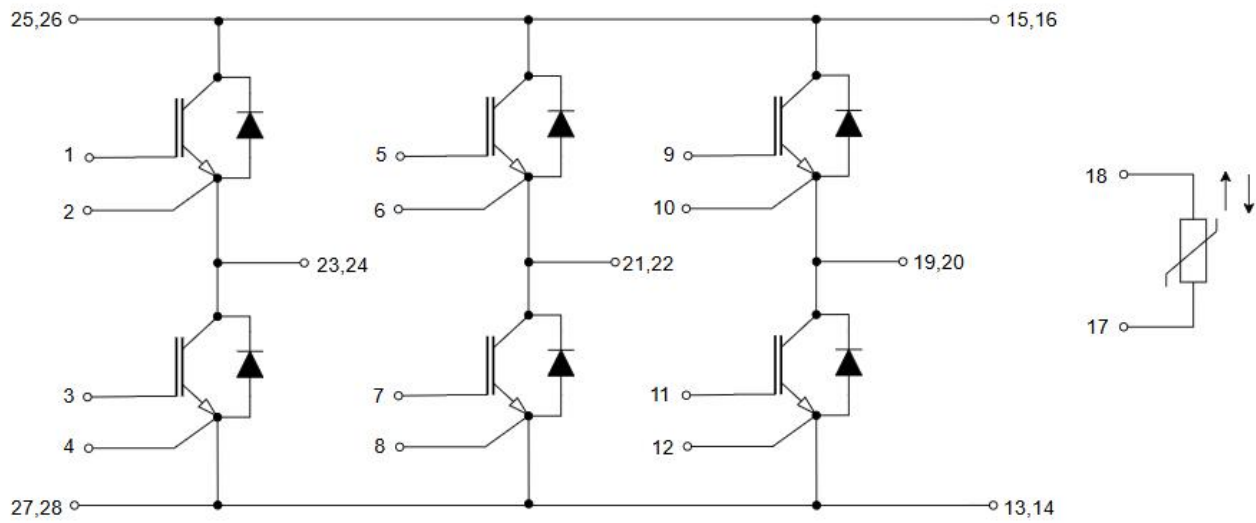
Symbol	Parameter	Test Condition	Min	Typ	Max	Unit
V _F	Diode Forward Voltage	I _F = 100 A, T _J = 25°C	--	1.60	2.60	V
		I _F = 100 A, T _J = 175°C	--	1.50	--	
T _{rr}	Reverse Recovery Time	V _{CE} =400V V _{GE} = 15 V I _F =100A, R _g =25Ω, T _{vj} =25°C	--	290	--	ns
IRM	Peak Reverse Recovery Current		--	34.1	--	A
Q _{rr}	Recovered Charge		--	4.78	--	μC
E _{rec}	Reverse Recovery Energy		--	0.68	--	mJ
T _{rr}	Reverse Recovery Time	V _{CE} =400V V _{GE} = 15 V I _F =100A, R _g =25Ω, T _{vj} =175°C	--	391	--	ns
IRM	Peak Reverse Recovery Current		--	79.2	--	A
Q _{rr}	Recovered Charge		--	11.48	--	μC
E _{rec}	Reverse Recovery Energy		--	0.957	--	mJ
R _{thJC}	Thermal resistance	Junction-to-Case (per diode)	--	0.55	--	K/W
T _{vj op}		Temperature under switching conditions	-40		150 ²⁾	°C

²⁾T_{vj op} > 150°C is only allowed for operation at overload conditions. For detailed specifications please refer to AN 2018-14.

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, R100=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

