

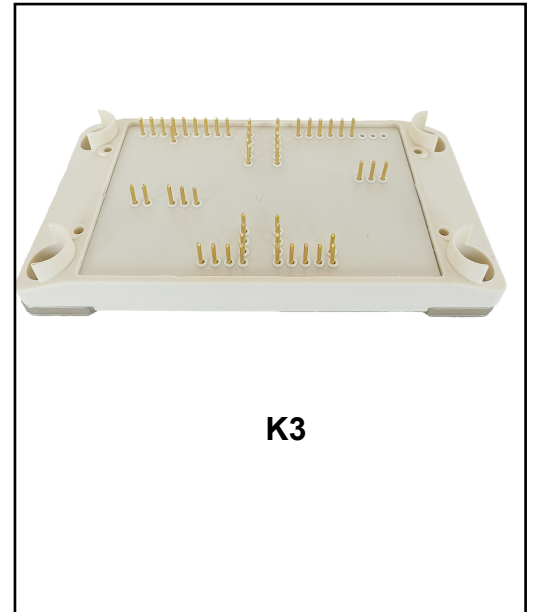
3-Level INPC Module with NCE Gen7 IGBTs

Features

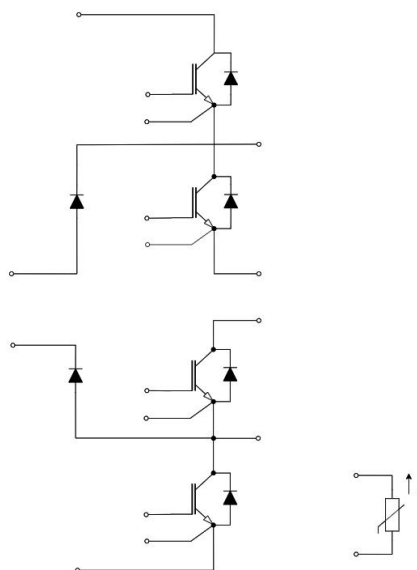
- Electrical features
 - Neutral Point Clamped Three-level Inverter Module
 - $T_{vj\ op}=150^{\circ}\text{C}$
 - Low Inductive Layout
 - Thermistor
- Mechanical features
 - Package with CTI >500
 - Solderable Pins
 - Low Package Height

Typical Applications

- Solar Inverters
- Energy Storage System



Description



Package Insulation coordination

Parameter	Symbol	Note or test condition	Values	Unit
Isolation test voltage	V_{ISOL}	RMS, $f=50\text{Hz}$, $t=60\text{s}$	3.2	kV
Internal isolation		basic insulation(class 1, IEC 61140)	Al_2O_3	
Creepage distance	d_{creep}	terminal to heatsink	14.2	mm
Clearance	d_{clear}	terminal to heatsink	12.4	mm
Comparative tracking index (electrical)	CTI		>500	
RTI Elec.	RTI	housing	140	°C

Package Characteristic values

Parameter	Symbol	Note or test condition		Values			Unit
				Min.	Typ.	Max.	
L_{sCE}	Stray inductance module				21		nH
Storage Temperature Range	T_{STG}			-40		125	°C
Mounting torque for module mounting	M	-Mounting according to valid application note	M5, Screw	3		5	Nm
Weight	G				250		g

IGBT (T1,T2,T3,T4)
Absolute Maximum Ratings (T_c = 25°C unless otherwise noted)

Symbol	Description	Value	Unit
V _{CES}	Collector–Emitter Voltage	1200	V
V _{GE}	Gate– Emitter Voltage	± 30	V
I _C	Continuous Collector Current @ T _c = 80°C, T _J = 175°C	225	A
I _{C(RM)}	T _p =1ms	450	A

Characteristics (T_c = 25°C unless otherwise noted)

Symbol	Parameter	Test Condition	Min	Typ	Max	Unit
I _{CES}	Collector–Emitter Cutoff Current	V _{GE} = 0 V, V _{CE} =1200V, T _{vj} = 25°C	--	--	1.0	mA
V _{CE(sat)}	Collector–Emitter Saturation Voltage	V _{GE} = 15 V, I _C =100 A	T _J = 25°C	--	1.05	V
			T _J = 150°C	--	1.25	
V _{CE(sat)}	Collector–Emitter Saturation Voltage	V _{GE} = 15 V, I _C =225 A	T _J = 25°C	--	1.45	V
			T _J = 150°C	--	1.65	
V _{GE(TH)}	Gate–Emitter Threshold Voltage	V _{GE} = V _{CE} , I _C =3 mA	4.0	5.0	6.0	V
R _{Gint}	Internal Gate Resistance	T _{vj} = 25 °C	--	0.5	--	Ω
I _{GES}	Gate Leakage Current	V _{GE} = ±20 V, V _{CE} = 0 V	--	--	400	nA
t _{d(on)}	Turn–On Delay Time	T _J = 25°C V _{CE} =600 V, I _C =225A V _{GE} = ± 15 V, R _{Gon} = 4.5Ω, R _{Goff} = 4.5Ω	--	103	--	ns
t _r	Rise Time		--	33	--	
t _{d(off)}	Turn–off Delay Time		--	307	--	
t _f	Fall Time		--	21	--	
E _{on}	Turn–On Switching Loss per Pulse		--	11.55	--	mJ
E _{off}	Turn Off Switching Loss per Pulse		--	4.64	--	
t _{d(on)}	Turn–On Delay Time	T _J = 150°C V _{CE} =600 V, I _C =225A V _{GE} = ± 15 V, R _{Gon} = 4.5Ω, R _{Goff} = 4.5Ω	--	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		--	15.45	--	mJ
E _{off}	Turn Off Switching Loss per Pulse		--	9.19	--	
C _{iss}	Input Capacitance	V _{CE} = 25 V, V _{GE} = 0 V, f = 100 kHz	--	37.0	--	nF
C _{oss}	Output Capacitance		--	0.79	--	
C _{rss}	Reverse Transfer Capacitance		--	0.15	--	
Q _g	Total Gate Charge	V _{GE} = ± 15 V	--	1.19	--	μC
R _{thJC}	Thermal Resistance – Chip–to–Case		--	0.125	--	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.

DIODE (D5, D6)

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

Symbol	Description	Value	Unit
V _{RRM}	Peak Repetitive Reverse Voltage	1200	V
I _F	Continuous Forward Current @T _J = 150°C	300	A
I _{FRM}	Repetitive Peak Forward Current @T _J = 150°C	600	A

Characteristics (T_c = 25°C unless otherwise noted)

Symbol	Parameter	Test Condition		Min	Typ	Max	Unit
V _F	Diode Forward Voltage	I _F = 150 A, V _{GE} = 0 V	T _J = 25°C	--	1.50	2.50	V
			T _J = 150°C	--	1.40	--	
V _F	Diode Forward Voltage	I _F = 300 A, V _{GE} = 0 V	T _J = 25°C	--	1.80	2.80	V
			T _J = 150°C	--	1.70	--	
Q _{rr}	Reverse Recovery Charge	T _J = 25°C V _R =600 V, I _F =300A V _{GE} = ± 15 V, R _{Gon} = 4.5Ω, R _{Goff} = 4.5Ω		--	2.89	--	μC
I _{RRM}	Peak Reverse Recovery Current			--	23.1	--	A
E _{REC}	Reverse Recovery Energy			--	0.448	--	mJ
Q _{rr}	Reverse Recovery Charge	T _J = 150°C V _R =600 V, I _F =300A V _{GE} = ± 15 V, R _{Gon} = 4.5Ω, R _{Goff} = 4.5Ω		--	5.63	--	μC
I _{RRM}	Peak Reverse Recovery Current			--	29.4	--	A
E _{REC}	Reverse Recovery Energy			--	1.204	--	mJ
R _{thJC}	Thermal Resistance – Chip-to-Case				0.22		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.

DIODE (D1, D4)

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

Symbol	Description	Value	Unit
V _{RRM}	Peak Repetitive Reverse Voltage	1200	V
I _F	Continuous Forward Current @T _J = 150°C	300	A
I _{FRM}	Repetitive Peak Forward Current @T _J = 150°C	600	A

Characteristics (T_c = 25°C unless otherwise noted)

Symbol	Parameter	Test Condition		Min	Typ	Max	Unit
V _F	Diode Forward Voltage	I _F = 150 A, V _{GE} = 0 V	T _J = 25°C	--	1.50	2.50	V
			T _J = 150°C	--	1.40	--	
V _F	Diode Forward Voltage	I _F = 300 A, V _{GE} = 0 V	T _J = 25°C	--	1.80	2.80	V
			T _J = 150°C	--	1.70	--	
Q _{rr}	Reverse Recovery Charge	T _J = 25°C V _R = 600 V, I _F = 300A		--	2.89	--	μC
I _{RRM}	Peak Reverse Recovery Current	V _{GE} = ± 15 V, R _{Gon} = 4.5Ω, R _{Goff} = 4.5Ω		--	23.1	--	A
E _{REC}	Reverse Recovery Energy			--	0.448	--	mJ
Q _{rr}	Reverse Recovery Charge	T _J = 150°C V _R = 600 V, I _F = 300A		--	5.63	--	μC
I _{RRM}	Peak Reverse Recovery Current	V _{GE} = ± 15 V, R _{Gon} = 4.5Ω, R _{Goff} = 4.5Ω		--	29.4	--	A
E _{REC}	Reverse Recovery Energy			--	1.204	--	mJ
R _{thJC}	Thermal Resistance – Chip-to–Case				0.2		K/W
T _{vj op}		Temperature under switching conditions		–40		175 ³⁾	°C

³⁾T_{vj op} > 150°C is only allowed for operation at overload conditions.

DIODE (D2, D3)

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

Symbol	Description	Value	Unit
V _{RRM}	Peak Repetitive Reverse Voltage	1200	V
I _F	Continuous Forward Current @T _J = 150°C	200	A
I _{FRM}	Repetitive Peak Forward Current @T _J = 150°C	400	A

Characteristics (T_c = 25°C unless otherwise noted)

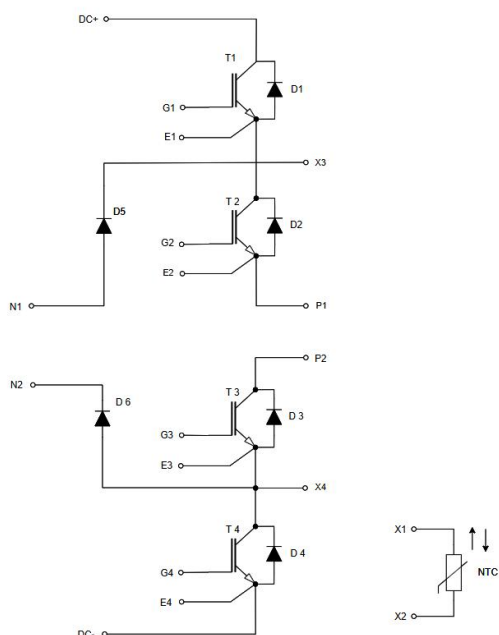
Symbol	Parameter	Test Condition		Min	Typ	Max	Unit
V _F	Diode Forward Voltage	I _F = 100 A, V _{GE} = 0 V	T _J = 25°C	--	1.50	2.50	V
			T _J = 150°C	--	1.40	--	
V _F	Diode Forward Voltage	I _F = 200 A, V _{GE} = 0 V	T _J = 25°C	--	1.80	2.80	V
			T _J = 150°C	--	1.70	--	
Q _{rr}	Reverse Recovery Charge	T _J = 25°C V _R =600 V, I _F =200A V _{GE} = ± 15 V, R _{Gon} = 4.5Ω, R _{Goff} = 4.5Ω		--	2.75	--	μC
I _{RRM}	Peak Reverse Recovery Current			--	23.1	--	A
E _{REC}	Reverse Recovery Energy			--	1.08	--	mJ
Q _{rr}	Reverse Recovery Charge	T _J = 150°C V _R =600 V, I _F =200A V _{GE} = ± 15 V, R _{Gon} = 4.5Ω, R _{Goff} = 4.5Ω		--	6.39	--	μC
I _{RRM}	Peak Reverse Recovery Current			--	35.7	--	A
E _{REC}	Reverse Recovery Energy			--	1.39	--	mJ
R _{thJC}	Thermal Resistance – Chip-to-Case				0.27		K/W
T _{vj op}		Temperature under switching conditions		-40		175 ⁴⁾	°C

⁴⁾T_{vj op} > 150°C is only allowed for operation at overload conditions.

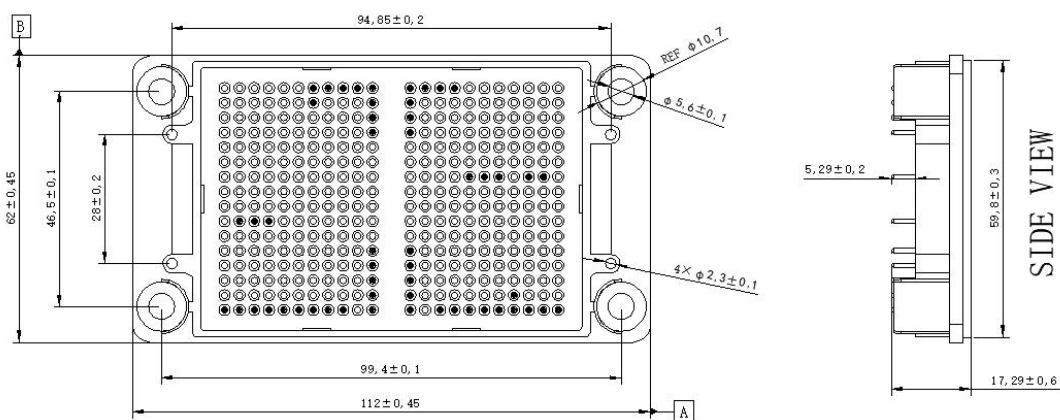
THERMISTOR PROPERTIES

Symbol	Parameter	Test Condition	Min	Typ	Max	Unit
R ₂₅	Rated Resistance	T=25°C	-	5	-	KΩ
R ₁₀₀	Rated Resistance	T=100°C	-	478.5	-	Ω
▲ R/R	Deviation of R25		-1	-	1	%
P ₂₅	Power Dissipation			210		mW
	Power Dissipation Constant			3.5		mW/K
B _{25/85}	B-value	B(25/80), tolerance ±1%	-	3480	-	K
B _{25/50}	B-value	B(25/50), tolerance ±1%	-	3473	-	K
B _{25/100}	B-value	B(25/100), tolerance ±1%	-	3481	-	K

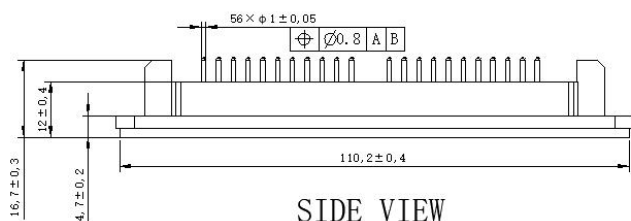
PACKAGE DIMENSIONS



PACKAGE DIMENSIONS



TOP VIEW



SIDE VIEW

