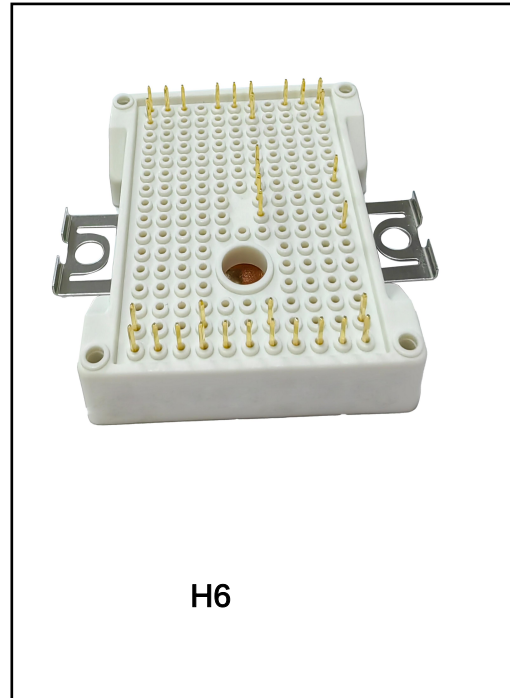


H6 PACK module with Gen.7 Trench/Fieldstop IGBT and Emitter Controlled diode and NTC

Features

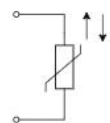
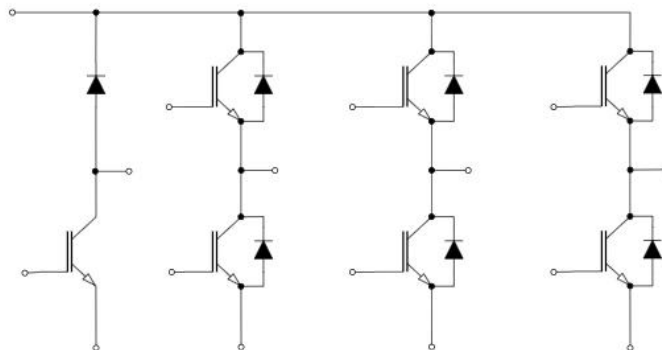
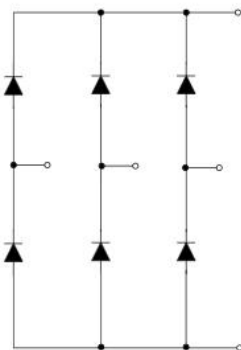
- Electrical features
 - $V_{CES} = 1200\text{ V}$
 - $I_{C\text{ nom}} = 50\text{ A} / I_{CRM} = 100\text{ A}$
 - Low V_{CESat}
 - $10\mu\text{s}$ short circuit capability
 - Overload operation up to 175°C
- Mechanical features
 - Integrated NTC temperature sensor
 - Isolated heatsink using DBC technology
 - Low inductance case
 - Solder contact technology



Typical Applications

- Auxiliary inverters
- Motor drives
- Servo 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	11.5	mm
Clearance	d_{clear}	terminal to heatsink	10	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		--	35	--	nH
Module Lead Resistance, Terminal to Chip	$R_{AA'+CC'}$	$T_C=25^{\circ}C$, per switch	--	6.0	--	mΩ
Module Lead Resistance, Terminal to Chip	$R_{CC'+EE'}$	$T_C=25^{\circ}C$, per switch	--	5.0	--	mΩ
Storage Temperature Range	T_{STG}		-40		125	°C
Mounting Torque	F	M5, Screw	40		80	N
Weight	G		--	39	--	g

IGBT, Inverter

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 _C	Collector Current @ T _C =25°C	100	A
	Collector Current @ T _C =80°C	50	A
I _{CM}	Pulsed Collector Current, t _p =1s	100	A
T _{Jmax}	Maximum Junction Temperature	175	°C

Characteristics (T_C = 25°C unless otherwise noted)

Symbol	Parameter	Test Condition	Min	Typ	Max	Unit
V _{CE(sat)}	Collector-Emitter Saturation Voltage	V _{GE} = 15 V, I _C = 50 A, T _{vj} = 25°C	--	1.80	2.20	V
		V _{GE} = 15 V, I _C = 50 A, T _{vj} = 125°C	--	1.95	--	
		V _{GE} = 15 V, I _C = 50 A, T _{vj} = 150°C	--	2.00	--	
V _{GE(TH)}	Gate-Emitter Threshold Voltage	V _{GE} = V _{CE} , I _C = 1 mA, T _{vj} = 25°C	5.0	6.0	7.0	V
I _{CES}	Collector-Emitter Cutoff Current	V _{GE} = 0 V, V _{CE} = V _{CES} , T _{vj} = 25°C	--	--	200	μA
I _{GES}	Gate-Emitter Leakage Current	V _{GE} = V _{GES} , V _{CE} = 0 V, T _{vj} = 25°C	--	--	200	nA
R _{Gint}	Internal Gate Resistance		--	1.27	--	Ω
C _{ies}	Input Capacitance	V _{CE} =25V, f=1MHz, V _{GE} =0V	--	5.07	--	nF
C _{res}	Reverse Transfer		--	0.13	--	nF
Q _G	Gate Charge	V _{GE} =15V, I _C =50A	--	0.19	--	μC
t _{d(on)}	Turn-On Delay Time	V _{CC} = 600 V, I _C = 50 A R _{Gon} = 10Ω, R _{Goff} = 25Ω , V _{GE} = ±15V Inductive Load T _{vj} = 25°C	--	110	--	ns
t _r	Rise Time		--	30	--	
t _{d(off)}	Turn-off Delay Time		--	180	--	
t _f	Fall Time		--	190	--	
E _{on}	Turn-On Switching Loss per Pulse		--	2.83	--	mJ
E _{off}	Turn Off Switching Loss per Pulse		--	4.42	--	
t _{d(on)}	Turn-On Delay Time	V _{CC} = 600 V, I _C = 50 A R _{Gon} = 10Ω, R _{Goff} = 25Ω , V _{GE} = ±15V Inductive Load T _{vj} = 125°C	--	120	--	ns
t _r	Rise Time		--	30	--	
t _{d(off)}	Turn-off Delay Time		--	230	--	
t _f	Fall Time		--	340	--	
E _{on}	Turn-on Switching Loss per Pulse		--	4.16	--	mJ
E _{off}	Turn Off Switching Loss per Pulse		--	5.24	--	
t _{d(on)}	Turn-On Delay Time	V _{CC} = 600 V, I _C = 50 A R _{Gon} = 10Ω, R _{Goff} = 25Ω , V _{GE} = ±15V Inductive Load T _{vj} = 150°C	--	110	--	ns
t _r	Rise Time		--	40	--	
t _{d(off)}	Turn-off Delay Time		--	240	--	
t _f	Fall Time		--	330	--	
E _{on}	Turn-on Switching Loss per Pulse		--	4.87	--	mJ
E _{off}	Turn Off Switching Loss per Pulse		--	5.49	--	
I _{SC}	SC Data	t _p ≤ 10μs, V _{GE} ≤ 15V, T _{vj} = 150°C, V _{CC} = 800V, V _{CEmax} = V _{CES} - L _{sCE} · di/dt	--	130	--	A
R _{thJC}	Thermal resistance	Junction-to-Case (per IGBT)	--	0.45	--	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 (Tc = 25°C unless otherwise noted)

Symbol	Description	Value	Unit
V _{RRM}	Repetitive Peak Reverse Voltage	1200	V
I _F	Diode Continuous Forward Current	50	A
I _{FM}	Diode Maximum Forward Current t _p =1ms	150	A

Characteristics (Tc=25°C unless otherwise noted)

Symbol	Parameter	Test Condition	Min	Typ	Max	Unit
V _F	Diode Forward Voltage	I _F =50A		T _J =25°C	--	V
				T _J =175°C	--	
Q _r	Recovered Charge	I _F =50A, R _g =25Ω, T _J =25°C	--	1.06	--	μC
I _{RM}	Peak Reverse Recovery Current		--	39.5	--	A
T _{rr}	Reverse Recovery Time		--	126	--	ns
E _{rec}	Reverse Recovery Energy		--	0.44	--	mJ
Q _r	Recovered Charge	I _F =50A, R _g =25Ω, T _J =175°C	--	TBD	--	μC
I _{RM}	Peak Reverse Recovery Current		--	TBD	--	A
T _{rr}	Reverse Recovery Time		--	TBD	--	ns
E _{rec}	Reverse Recovery Energy		--	TBD	--	mJ
R _{thJC}	Thermal resistance	Junction-to-Case (per diode)	--	0.6	--	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. For detailed specifications please refer to AN 2018-14.

Diode, Rectifier

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

Symbol	Description	Value	Unit
V _{RRM}	Repetitive Peak Reverse Voltage	1600	V
I _F	Diode Continuous Forward Current	50	A
I _{FM}	Diode Maximum Forward Current t _p =1ms	100	A

Characteristics (Tc=25°C unless otherwise noted)

Symbol	Parameter	Test Condition	Min	Typ	Max	Unit
V _F	Diode Forward Voltage	I _F = 50 A, T _J = 150 °C	--	1.0	--	V
I _R	Reverse Current	T _J =175 °C, V _R =1600V	--	3	--	mA
R _{thJC}	Thermal resistance	Junction-to-Case (per diode)		0.53		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. For detailed specifications please refer to AN 2018-14.

IGBT, Chopper

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 _C	Collector Current @ T _c =25°C	100	A
	Collector Current @ T _c =80°C	35	A
I _{CM}	Pulsed Collector Current, t _p =1S	105	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 =35A, V _{GE} =15V	T _{vj} =25°C	--	1.50	2.10	V
			T _{vj} = 175 °C	--	1.75	--	
V _{GE(th)}	Gate Threshold Voltage	I _C =1mA,V _{CE} =V _{GE}		5.5	--	7.0	V
I _{CES}	Collector-Emitter Leakage Current	V _{GE} =0V,V _{CE} =1200V		--	--	10	uA
I _{GES}	Gate-Emitter Leakage Current	V _{GE} =30V,V _{CE} =0V		--	--	100	nA
R _{Gint}	Internal Gate Resistance	f=1MHz		--	0.6	--	Ω
C _{ies}	Input Capacitance	V _{CE} =25V,V _{GE} =0V, f=1MHz		--	4.20	--	nF
C _{oes}	Out Capacitance			--	0.107	--	nF
C _{res}	Reverse Transfer			--	0.024	--	nF
Q _G	Gate Charge	V _{CE} =960V, I _C =35A,V _{GE} =15V		--	0.147	--	μC
t _{d(on)}	Turn-On Delay Time	V _{CE} =600V,I _C =35A, V _{GE} =0/15V, R _g =25Ω, Inductive Load		--	71	--	ns
t _r	Rise Time			--	53	--	
t _{d(off)}	Turn-off Delay Time			--	261	--	
t _f	Fall Time			--	66.3	--	
E _{on}	Turn-On Switching Loss per Pulse			V _{CE} =600V,I _C =35A, V _{GE} =0/15V,R _g =25Ω, Inductive Load, T _j =175°C		--	2.34
E _{off}	Turn Off Switching Loss per Pulse	--	1.44			--	
t _{d(on)}	Turn-On Delay Time	--	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	V _{CE} =600V,I _C =35A, V _{GE} =0/15V,R _g =25Ω, Inductive Load, T _j =175°C		--	3.64	--	mJ
E _{off}	Turn Off Switching Loss per Pulse			--	2.00	--	
I _{SC}	SC Data	V _{GE} =15V,V _{CC} ≤600V, t _{sc} ≤10us,T _j ≤150°C		--	175	--	A
R _{thJC}	Thermal resistance	Junction-to-Case (per IGBT)			0.5		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. For detailed specifications please refer to AN 2018-14.

Diode, Chopper

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	25	A
I _{FM}	Diode Maximum Forward Current t _p =1ms	50	A

Characteristics (T_C=25°C unless otherwise noted)

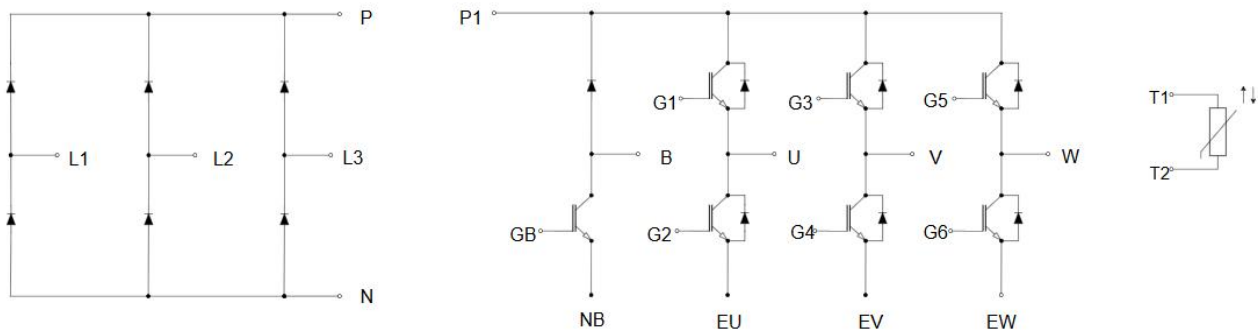
Symbol	Parameter	Test Condition	Min	Typ	Max	Unit
V _F	Diode Forward Voltage	I _F =25A		T _J =25°C	--	V
				T _J =175°C	--	
Q _r	Recovered Charge	I _F =25A, R _g =25Ω, T _J =25°C	--	0.47	--	μC
I _{RM}	Peak Reverse Recovery Current		--	18.2	--	A
T _{rr}	Reverse Recovery Time		--	58	--	ns
E _{rec}	Reverse Recovery Energy		--	0.19	--	mJ
Q _r	Recovered Charge	I _F =25A, R _g =25Ω, T _J =175°C	--	TBD	--	μC
I _{RM}	Peak Reverse Recovery Current		--	TBD	--	A
T _{rr}	Reverse Recovery Time		--	TBD	--	ns
E _{rec}	Reverse Recovery Energy		--	TBD	--	mJ
R _{thJC}	Thermal resistance	Junction-to-Case (per diode)		0.75		K/W
T _{vj op}		Temperature under switching conditions	-40		175 ⁵⁾	°C

⁵⁾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, 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

