

IGBT Power Module

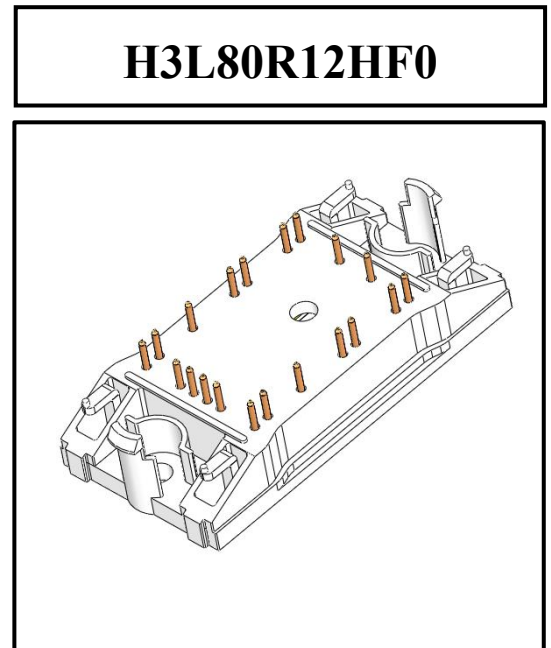
(1200V 80A T-NPC)

1. Product Features

- Trench field stop IGBT technology
- Maximum junction temperature 175°C
- NTC temperature monitor

2. Product Applications

- Uninterruptible Power Supply
- Solar Inverter
- Energy Storage System



3. Typical Performance Parameters

Type	I_c	T_{str}	Marking	Package
H3L80R12HF0	80A	-40~125°C	H3L80R12HF0	HF0

4. IGBT Characteristics - T1/T4

Symbol	Parameters	Min.	Typ.	Max.	Unit	Test Conditions
V_{CES}	Collector-emitter voltage		1200		V	$V_{GE} = 0V, T_c = 25^\circ C$
I_C	Collector-emitter current		80		A	$T_c = 80^\circ C, T_{vj} = 175^\circ C$
V_{CESat}	Collector-emitter Saturation Voltage		1.7	2.4	V	$V_{GE} = 15V, I_C = 80A, T_{vj} = 25^\circ C$
$V_{GE(th)}$	Gate Threshold Voltage		5.5		V	$V_{CE} = V_{GE}, I_C = 1mA, T_{vj} = 25^\circ C$
I_{CES}	Collector-emitter Cut-off Current		TBD		nA	$V_{CE} = 1200V, V_{GE} = 0V, T_{vj} = 25^\circ C$
I_{GES}	Gate-Emitter Leakage Current		TBD		uA	$V_{GE} = 20V, V_{CE} = 0V, T_{vj} = 25^\circ C$
$R_{g(int)}$	Internal Gate Resistance		TBD		Ω	$V_{GE} = 15V, T_{vj} = 25^\circ C$
R_{thj-c}	Thermal Resistance, Junction to Case		0.47		K/W	Per IGBT
C_{ies}	Input Capacitance		TBD		pF	$V_{ce} = 25V, V_{ge} = 0V, f = 1MHz$
C_{oes}	Output Capacitance		TBD		pF	
C_{res}	Reverse Capacitance		TBD		pF	
$t_{d(on)}$	Turn-on delay time		TBD		ns	$V_{CE} = 350V$ $I_C = 60A$ $V_{GE} = \pm 15V$ $R_{GE(EXT)} = 5\Omega$
t_r	Rise time		TBD		ns	
E_{on}	Turn-on energy loss		2.3		mJ	
$t_{d(off)}$	Turn-off delay time		TBD		ns	
t_f	Fall time		TBD		ns	
E_{off}	Turn-off energy loss		1.6		mJ	

5. Diode Characteristics - D1/D4

Symbol	Parameters	Min.	Typ.	Max.	Unit	Test Conditions
V_{RRM}	Repetitive Peak Reverse Voltage		1200		V	$T_{vj} = 25^{\circ}C$
I_F	Forward Current		40		A	$T_C = 80^{\circ}C, T_{vj} = 175^{\circ}C$
V_F	Diode Forward Voltage		2.0	2.4	V	$I_f = 60A, T_{vj} = 25^{\circ}C$
I_{FSM}	Non-Repetitive Surge Forward Current		TBD		A	
R_{thj-c}	Thermal Resistance, junction to case		0.98		K/W	<i>Per diode</i>
T_{vj}	Junction Temperature	-40		175	$^{\circ}C$	
t_{rr}	Reverse Recovery Time		TBD		ns	$T_{vj} = 25^{\circ}C$ $V_{CE} = 350V$ $I_F = 60A$ $V_{GE} = \pm 15V$ $R_{GE(EXT)} = 20\Omega$
Q_{rr}	Reverse Recovery Charge		TBD		μC	
I_{rm}	Peak Reverse Recovery Current		TBD		A	
E_{rr}	Reverse Recovery Energy		TBD		μJ	

6. IGBT Characteristics - T2/T3

Symbol	Parameters	Min.	Typ.	Max.	Unit	Test Conditions
V_{CES}	Collector-emitter voltage		650		V	$V_{GE} = 0V, T_c = 25^\circ C$
I_c	Collector-emitter current		60		A	$T_c = 80^\circ C, T_{vj} = 175^\circ C$
V_{CESat}	Collector-emitter Saturation Voltage		1.45	1.9	V	$V_{GE} = 15V, I_c = 60A, T_{vj} = 25^\circ C$
$V_{GE(th)}$	Gate Threshold Voltage		5.8		V	$V_{CE} = V_{GE}, I_c = 1mA, T_{vj} = 25^\circ C$
I_{CES}	Collector-emitter Cut-off Current		TBD		nA	$V_{CE} = 1200V, V_{GE} = 0V, T_{vj} = 25^\circ C$
I_{GES}	Gate-Emitter Leakage Current		TBD		uA	$V_{GE} = 20V, V_{CE} = 0V, T_{vj} = 25^\circ C$
$R_{g(int)}$	Internal Gate Resistance		TBD		Ω	$V_{GE} = 15V, T_{vj} = 25^\circ C$
R_{thj-c}	Thermal Resistance, Junction to Case		0.87		K/W	Per IGBT
C_{ies}	Input Capacitance		TBD		pF	$V_{CE} = 25V, V_{GE} = 0V, f = 1MHz$
C_{oes}	Output Capacitance		TBD		pF	
C_{res}	Reverse Capacitance		TBD		pF	
$t_{d(on)}$	Turn-on delay time		TBD		ns	$V_{CE} = 350V$ $I_c = 60A$ $V_{GE} = \pm 15V$ $R_{GE(EXT)} = 20\Omega$
t_r	Rise time		TBD		ns	
E_{on}	Turn-on energy loss		2.5		mJ	
$t_{d(off)}$	Turn-off delay time		TBD		ns	
t_f	Fall time		TBD		ns	
E_{off}	Turn-off energy loss		1.5		mJ	

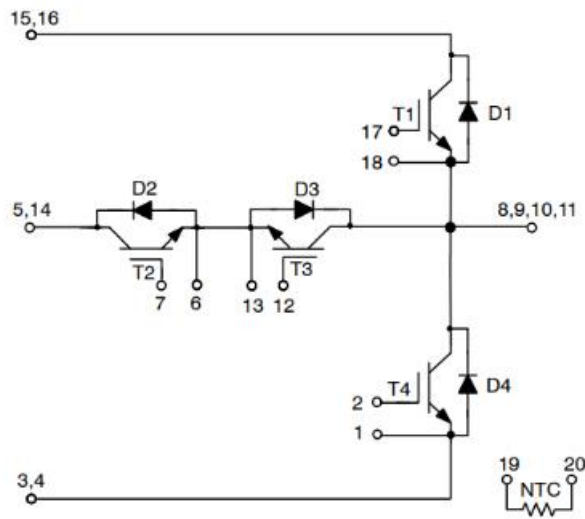
7. Diode Characteristics - D2/D3

Symbol	Parameters	Min.	Typ.	Max.	Unit	Test Conditions
V_{RRM}	Repetitive Peak Reverse Voltage		650		V	$T_{vj} = 25^{\circ}C$
I_F	Forward Current		40		A	$T_c = 80^{\circ}C, T_{vj} = 175^{\circ}C$
V_F	Diode Forward Voltage		1.6	1.85	V	$I_f = 60A, T_{vj} = 25^{\circ}C$
I_{FSM}	Non-Repetitive Surge Forward Current		TBD		A	
R_{thj-c}	Thermal Resistance, junction to case		1.29		K/W	<i>Per diode</i>
T_{VJ}	Junction Temperature	-40		175	$^{\circ}C$	
t_{rr}	Reverse Recovery Time		TBD		ns	$T_{vj} = 25^{\circ}C$ $V_{CE} = 350V$ $I_F = 60A$ $V_{GE} = \pm 15V$ $R_{GE}(EXT) = 5\Omega$
Q_{rr}	Reverse Recovery Charge		TBD		μC	
I_{rrm}	Peak Reverse Recovery Current		TBD		A	
E_{rr}	Reverse Recovery Energy		TBD		μJ	

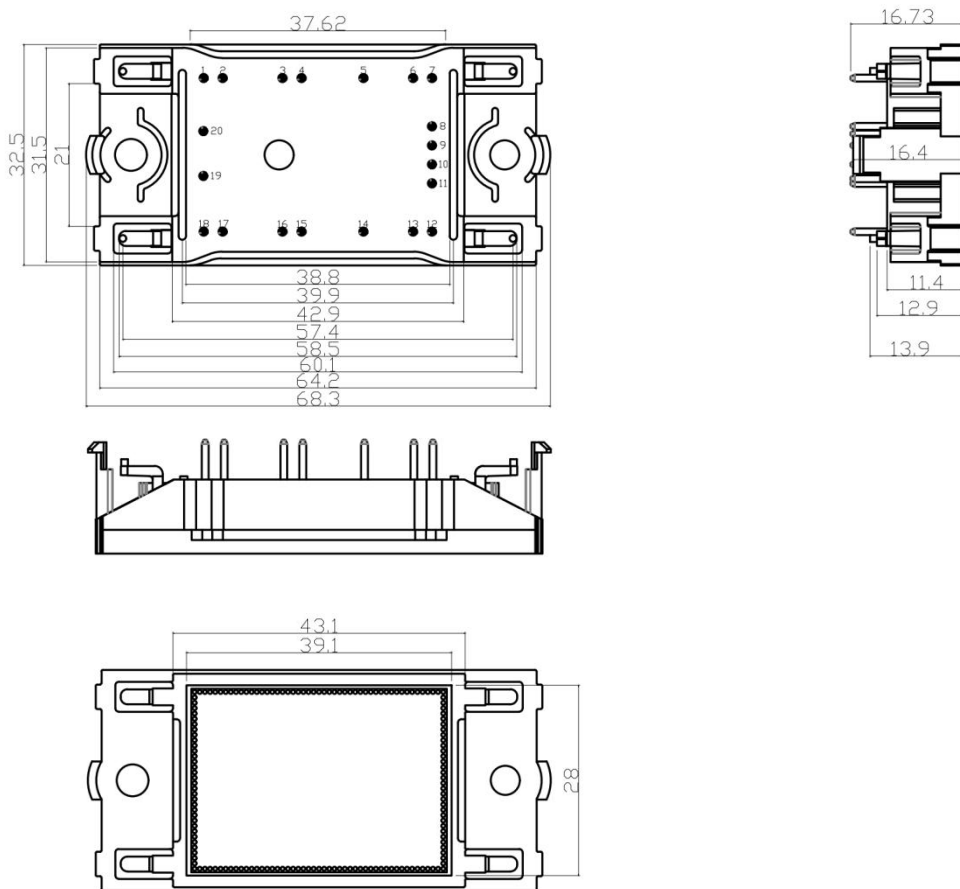
8. NTC Thermistor

Symbol	Parameters	Min.	Typ.	Max.	Unit	Test Conditions
R ₂₅	Rated resistance		5		kΩ	T _c = 25°C
R/R	Deviation of R ₁₀₀	-5		5	%	T _c = 100°C, R ₁₀₀ = 493
P ₂₅	Power Dissipation			20	mW	T _c = 25°C
B _{25/50}	B-value		3375		K	$R_2 = R_{25} \exp [B_{25/50}(1/T_2 - 1/(298,15 K))]$
B _{25/80}	B-value		3411		K	$R_2 = R_{25} \exp [B_{25/80}(1/T_2 - 1/(298,15 K))]$
B _{25/100}	B-value		3433		K	$R_2 = R_{25} \exp [B_{25/100}(1/T_2 - 1/(298,15 K))]$

9. Circuit Diagram



10. Package Dimensions



11. Version Information

Version No.	Status	Modified on	Revision record
Rev 1.0	Initial version	2023/02/21	Advance version