

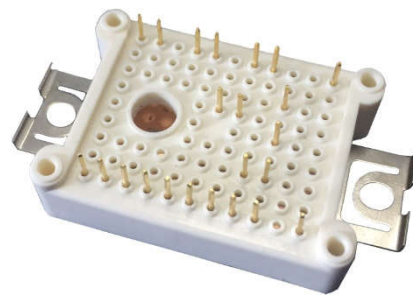
FEATURES

- V_{CEsat} with positive temperature coefficient
- Low V_{CEsat}
- Low inductance case
- 10 μ s short circuit capability
- Isolated copper baseplate using DBC technology

Preliminary Data

$V_{CES} = 1200V$

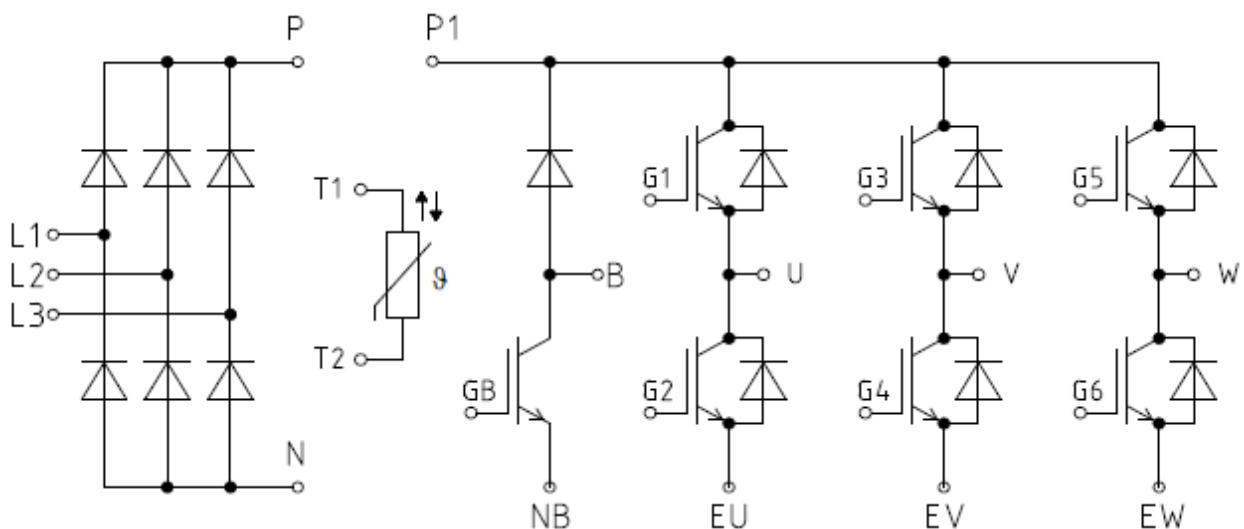
$I_C \text{ nom} = 10A / I_{CRM} = 20A$



APPLICATION

- Motor drivers
- Air Conditioning
- Auxiliary inverters

Equivalent Circuit Schematic



IGBT, Inverter

Maximum Rated Values

Parameter	Conditions	Symbol	Values	Units
Collector-emitter voltage	$T_{vj} = 25^{\circ}\text{C}$	V_{CES}	1200	V
Continuous DC collector current	$T_C = 100^{\circ}\text{C}$, $T_{vj} \text{ max} = 175^{\circ}\text{C}$	I_C	10	A
Repetitive peak collector current	$t_p = 1 \text{ ms}$	I_{CRM}	20	A
Total power dissipation	$T_C = 25^{\circ}\text{C}$, $T_{vj} \text{ max} = 175^{\circ}\text{C}$	P_{tot}	123	W
Gate-emitter peak voltage		V_{GE}	± 20	V

Characteristic Values

Parameter	Conditions	Symbol	Values			Units
			Min.	Typ.	Max.	
Collector-emitter saturation voltage	$I_C = 10 \text{ A}$, $V_{GE} = 10 \text{ V}$ $T_{vj} = 25^{\circ}\text{C}$ $T_{vj} = 150^{\circ}\text{C}$	V_{CESat}		1.85 2.10		V
Gate threshold voltage	$I_C = 1.5 \text{ mA}$, $V_{CE} = V_{GE}$ $T_{vj} = 25^{\circ}\text{C}$	V_{GEth}		6.1		V
Gate charge	$V_{GE} = -15 / 15 \text{ V}$	Q_G		0.065		μC
Input capacitance	$f = 1 \text{ MHz}$, $T_{vj} = 25^{\circ}\text{C}$, $V_{CE} = 25 \text{ V}$, $V_{GE} = 0 \text{ V}$	C_{ies}		0.65		nF
Reverse transfer capacitance		C_{res}		0.02		nF
Collector-emitter cut-off current	$V_{CE} = 1200 \text{ V}$, $V_{GE} = 0 \text{ V}$, $T_{vj} = 25^{\circ}\text{C}$	I_{CES}			1.0	mA
Gate-emitter leakage current	$V_{CE} = 0 \text{ V}$, $V_{GE} = 20 \text{ V}$, $T_{vj} = 25^{\circ}\text{C}$	I_{GES}			400	nA
Turn-on delay time, inductive load	$I_C = 10 \text{ A}$, $V_{CE} = 600 \text{ V}$ $V_{GE} = -15 / 15 \text{ V}$, $R_G = 20\Omega$ $T_{vj} = 25^{\circ}\text{C}$	$t_{d on}$		0.095		μs
Rise time, inductive load		t_r		0.164		μs
Turn-off delay time, inductive load		$t_{d off}$		0.11		μs
Fall time, inductive load		t_f		0.2		μs
Turn-on energy loss per pulse		E_{on}		1.33		mJ
Turn-off energy loss per pulse		E_{off}		0.36		mJ
SC data		$V_{GE} \leq 15 \text{ V}$, $V_{CC} = 800 \text{ V}$ $t_p \leq 10 \mu\text{s}$, $T_{vj} = 25^{\circ}\text{C}$	ISC		90	
Thermal resistance, junction to case	per IGBT	R_{thJC}		1.22		K/W
Thermal resistance, case to heatsink	per IGBT $\lambda_{Paste} = 1 \text{ W}/(\text{m}\cdot\text{K})$ / $\lambda_{grease} = 1 \text{ W}/(\text{m}\cdot\text{K})$	R_{thCH}		1.03		K/W
Temperature under switching conditions		$T_{vj op}$	-40		150	$^{\circ}\text{C}$

Diode, Inverter

Maximum Rated Values

Parameter	Conditions	Symbol	Values	Units
Repetitive peak reverse voltage	$T_{vj} = 25^{\circ}\text{C}$	VRRM	1200	V
Continuous DC forward current		IF	10	A
Repetitive peak forward current	$t_p = 1 \text{ ms}$	IFRM	20	A

Characteristic Values

Parameter	Conditions	Symbol	Values			Units
			Min.	Typ.	Max.	
Forward voltage	$I_F = 10\text{A}, V_{GE} = 0\text{V}$ $T_{vj} = 25^{\circ}\text{C}$	V_F		1.86		V
Peak reverse recovery current	$I_F = 10\text{A}, -d_{IF}/d_t = 800\text{A}/\mu\text{s}$ $V_R = 600\text{V}, V_{GE} = -15\text{V}$ $T_{vj} = 25^{\circ}\text{C}$	I_{RR}		18		A
Recovered charge		Q_{RR}		1.6		μC
Reverse recovery energy		E_{rec}		0.35		mJ
Thermal resistance, junction to case	per diode	R_{thJC}		1.24	1.4	K/W
Thermal resistance, case to heatsink	per diode $I_{paste} = 1\text{W}/(\text{m}\cdot\text{K}) / I_{grease} = 1\text{W}/(\text{m}\cdot\text{K})$	R_{thCH}		1.2		K/W
Temperature under switching conditions		$T_{vj op}$	-40		150	$^{\circ}\text{C}$

Diode, Rectifier

Maximum Rated Values

Parameter	Conditions	Symbol	Values	Units
Repetitive peak reverse voltage	$T_{vj} = 25^{\circ}\text{C}$	VRRM	1600	V
Maximum RMS current at rectifier output	$T_c = 80^{\circ}\text{C}$	IF	20	A

Characteristic Values

Parameter	Conditions	Symbol	Values			Units
			Min.	Typ.	Max.	
Forward voltage	$T_{vj} = 25^{\circ}\text{C}, I_F = 10\text{A}$	V_F		1.01		V
Reverse current	$T_{vj} = 25^{\circ}\text{C}, V_R = 1600\text{V}$	I_R		1.00		mA
Thermal resistance, junction to case	per diode	R_{thJC}		1.35	1.48	K/W
Thermal resistance, case to heatsink	per diode $I_{paste} = 1\text{W}/(\text{m}\cdot\text{K}) / I_{grease} = 1\text{W}/(\text{m}\cdot\text{K})$	R_{thCH}		1.23		K/W
Temperature under switching conditions		$T_{vj op}$	-40		150	$^{\circ}\text{C}$

IGBT, Brake-Chopper Maximum Rated Values

Parameter	Conditions	Symbol	Values	Units
Collector-emitter voltage	$T_{vj} = 25^{\circ}\text{C}$	V_{CES}	1200	V
Continuous DC collector current	$T_C = 100^{\circ}\text{C}$, $T_{vj} \text{ max} = 175^{\circ}\text{C}$	I_C	10	A
Repetitive peak collector current	$t_p = 1 \text{ ms}$	I_{CRM}	20	A
Total power dissipation	$T_C = 25^{\circ}\text{C}$, $T_{vj} \text{ max} = 175^{\circ}\text{C}$	P_{tot}	123	W
Gate-emitter peak voltage		V_{CES}	± 20	V

Characteristic Values

Parameter	Conditions	Symbol	Values			Units
			Min.	Typ.	Max.	
Collector-emitter saturation voltage	$I_C = 10 \text{ A}$, $V_{GE} = 10 \text{ V}$ $T_{vj} = 25^{\circ}\text{C}$ $T_{vj} = 150^{\circ}\text{C}$	V_{CESat}		1.85 2.10		V
Gate threshold voltage	$I_C = 1.5 \text{ mA}$, $V_{CE} = V_{GE}$ $T_{vj} = 25^{\circ}\text{C}$	V_{GEth}		6.1		V
Gate charge	$V_{GE} = -15 / 15 \text{ V}$	Q_G		0.065		μC
Input capacitance	$f = 1 \text{ MHz}$, $T_{vj} = 25^{\circ}\text{C}$, $V_{CE} = 25 \text{ V}$, $V_{GE} = 0 \text{ V}$	C_{ies}		0.65		nF
Reverse transfer capacitance		C_{res}		0.02		nF
Collector-emitter cut-off current	$V_{CE} = 1200 \text{ V}$, $V_{GE} = 0 \text{ V}$, $T_{vj} = 25^{\circ}\text{C}$	I_{CES}			1.0	mA
Gate-emitter leakage current	$V_{CE} = 0 \text{ V}$, $V_{GE} = 20 \text{ V}$, $T_{vj} = 25^{\circ}\text{C}$	I_{GES}			400	nA
Turn-on delay time, inductive load	$I_C = 10 \text{ A}$, $V_{CE} = 600 \text{ V}$ $V_{GE} = -15 / 15 \text{ V}$, $R_G = 20\Omega$ $T_{vj} = 25^{\circ}\text{C}$	$t_{d on}$		0.095		μs
Rise time, inductive load		t_r		0.164		μs
Turn-off delay time, inductive load		$t_{d off}$		0.11		μs
Fall time, inductive load		t_f		0.2		μs
Turn-on energy loss per pulse		E_{on}		1.33		mJ
Turn-off energy loss per pulse		E_{off}		0.36		mJ
SC data		$V_{GE} \leq 15 \text{ V}$, $V_{CC} = 800 \text{ V}$ $t_p \leq 10 \mu\text{s}$, $T_{vj} = 25^{\circ}\text{C}$	ISC		90	
Thermal resistance, junction to case	per IGBT	R_{thJC}		1.22		K/W
Thermal resistance, case to heatsink	per IGBT $\lambda_{Paste} = 1 \text{ W}/(\text{m}\cdot\text{K})$ / $\lambda_{grease} = 1 \text{ W}/(\text{m}\cdot\text{K})$	R_{thCH}		1.03		K/W
Temperature under switching conditions		$T_{vj op}$	-40		150	$^{\circ}\text{C}$

Diode, Brake-Chopper Maximum Rated Values

Parameter	Conditions	Symbol	Values	Units
Repetitive peak reverse voltage	$T_{vj} = 25^{\circ}\text{C}$	VRRM	1200	V
Continuous DC forward current		IF	10	A
Repetitive peak forward current	$t_p = 1 \text{ ms}$	IFRM	20	A

Characteristic Values

Parameter	Conditions	Symbol	Values			Units
			Min.	Typ.	Max.	
Forward voltage	$I_F = 10\text{A}, V_{GE} = 0\text{V}$ $T_{vj} = 25^{\circ}\text{C}$	V_F		1.86		V
Peak reverse recovery current	$I_F = 10\text{A}, -d_{iF}/d_t = 800\text{A}/\mu\text{s}$ $V_R = 600\text{V}, V_{GE} = -15\text{V}$ $T_{vj} = 25^{\circ}\text{C}$	I_{RR}		18		A
Recovered charge		Q_{RR}		1.6		μC
Reverse recovery energy		E_{rec}		0.35		mJ
Thermal resistance, junction to case	per diode	R_{thJC}		1.24	1.4	K/W
Thermal resistance, case to heatsink	per diode $I_{paste} = 1\text{W}/(\text{m}\cdot\text{K}) / I_{grease} = 1\text{W}/(\text{m}\cdot\text{K})$	R_{thCH}		1.2		K/W
Temperature under switching conditions		$T_{vj\text{ op}}$	-40		150	$^{\circ}\text{C}$

NTC-Thermistor Characteristic Values

Parameter	Conditions	Symbol	Values			Units
			Min.	Typ.	Max.	
Rated resistance	$T_{NTC} = 25^{\circ}\text{C}$	R_{25}		5		k Ω
Deviation of R100	$T_{NTC} = 100^{\circ}\text{C}, R_{100} = 493\ \Omega$	$\Delta R/R$	-5		5	%
Power dissipation	$T_{NTC} = 25^{\circ}\text{C}$	P_{25}			20	mW

Module

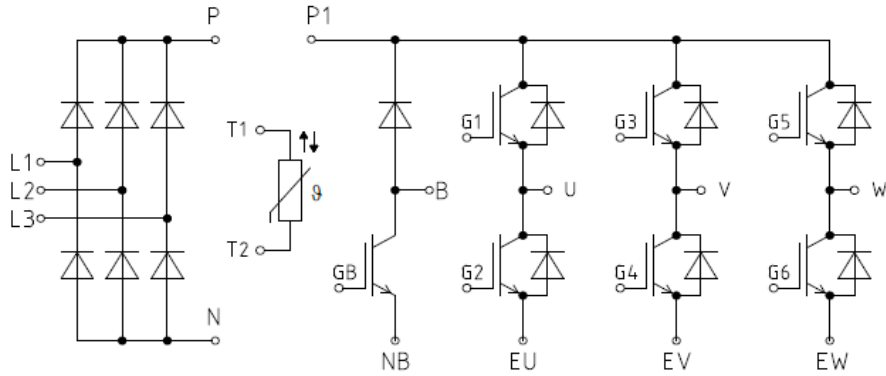
Maximum Rated Values

Parameter	Conditions	Symbol	Values	Units
Isolation test voltage	RMS, f = 50 Hz, t = 1 min.	VISOL	2.5	kV
Internal isolation	basic insulation (class 1, IEC 61140)		Al ₂ O ₃	
Creepage distance	terminal to heatsink terminal to terminal		11.5 6.3	mm
Clearance	terminal to heatsink terminal to terminal		10 5	mm
Comperative tracking index		CTI	>200	

Characteristic Values

Parameter	Conditions	Symbol	Values			Units
			Min.	Typ.	Max.	
Stray inductance module and fixture		L _{sCE}		28		nH
Module lead resistance, terminals - chip	TC = 25°C, per switch	R _{CC'+EE'} R _{AA'+CC'}		8 6		mΩ
Storage temperature		T _{stg}	-40		125	°C
Mounting force per clamp		F	20		50	N
Weight		G		24		g

Circuit diagram



Package outlines (mm)

