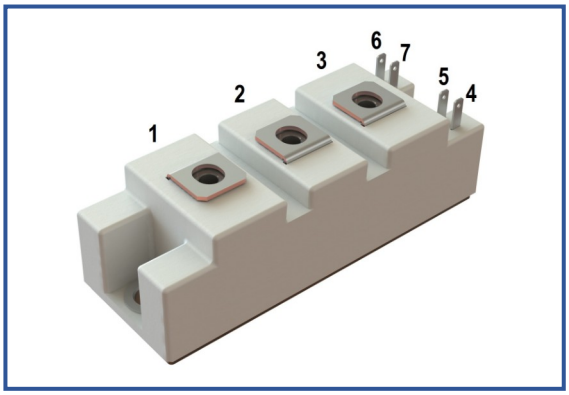
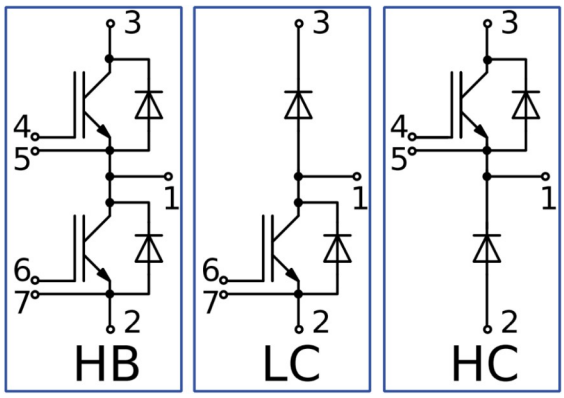
Industry standard 34mm IGBT module

1200 V 150 A





Chip features

- IGBT chip
  - low $V_{CE(sat)}$ value
  - 10 µs short circuit of 150°C
  - square RBSOA of 2xI_C
  - low EMI
- FRD chip
  - fast and soft reverse recovery
  - low voltage drop

Design features

- copper baseplate
- Al_2O_3 DBC substrate
- ultrasonically welded power terminals
- Improved termal cycling
- RoHS compliant

Typical application

- AC motor drives
- solar inverter
- air conditioning
- high power converters and UPS

Maximum rated values

Definition	Symbol	Conditions	Value	Unit
IGBT				
Collector-Emitter voltage	V_{CES}	V_{GE} = 0.	1200	V
Maximum allowable collector current (continuous)	$I_{C\ 25}$	$T_{vj\ (max)}$ = 175°C; T_c = 25°C.	230	A
	$I_{C\ 80}$	$T_{vj\ (max)}$ = 175°C; T_c = 80°C.	150	A
Repetitive peak collector current*1	I_{CRM}	I_{CRM} = 3 x $I_{C\ nom}$; t_p = 1 ms.	450	A
Short-circuit duration	t_{psc}	T_{vj} = 25°C; V_{GE} = ±15 V; V_{CE} = 720 V; $R_{G\ on}$ = $R_{G\ off}$ = 2.2 Ω; $I_{C\ max}$ < 1050 A.	10	µs
		T_{vj} = 150°C; V_{GE} = ±15 V; V_{CE} = 720 V; $R_{G\ on}$ = $R_{G\ off}$ = 2.2 Ω; $I_{C\ max}$ < 920 A.	10	
Gate-Emitter voltage	V_{GES}		±20	V
Junction operating temperature	$T_{vj\ (op)}$		-40…+150	°C
Inverse diode \ Freewheeling diode				
Repetitive peak reverse voltage	V_{RRM}	V_{GE} = 0 V.	1200	V
Maximum allowable forward current (continuous)	$I_{F\ 25}$	$T_{vj\ (max)}$ = 175°C; T_c = 25°C.	182	A
	$I_{F\ 80}$	$T_{vj\ (max)}$ = 175°C; T_c = 80°C.	123	A
Repetitive peak forward current*1	I_{FRM}	I_{FRM} = 3 x $I_{F\ nom}$; t_p = 1 ms.	450	A
Junction operating temperature	$T_{vj\ (op)}$		-40…+150	°C
Module				
Storage temperature	T_{stg}		-55…+50	°C
Isolation voltage	V_{isol}	AC sin 50 Hz; t = 1 min.	4000	V

*1 Pulse width and repetition rate should be such that device junction temperature does not exceed maximum T_{vj} rating

Characteristics

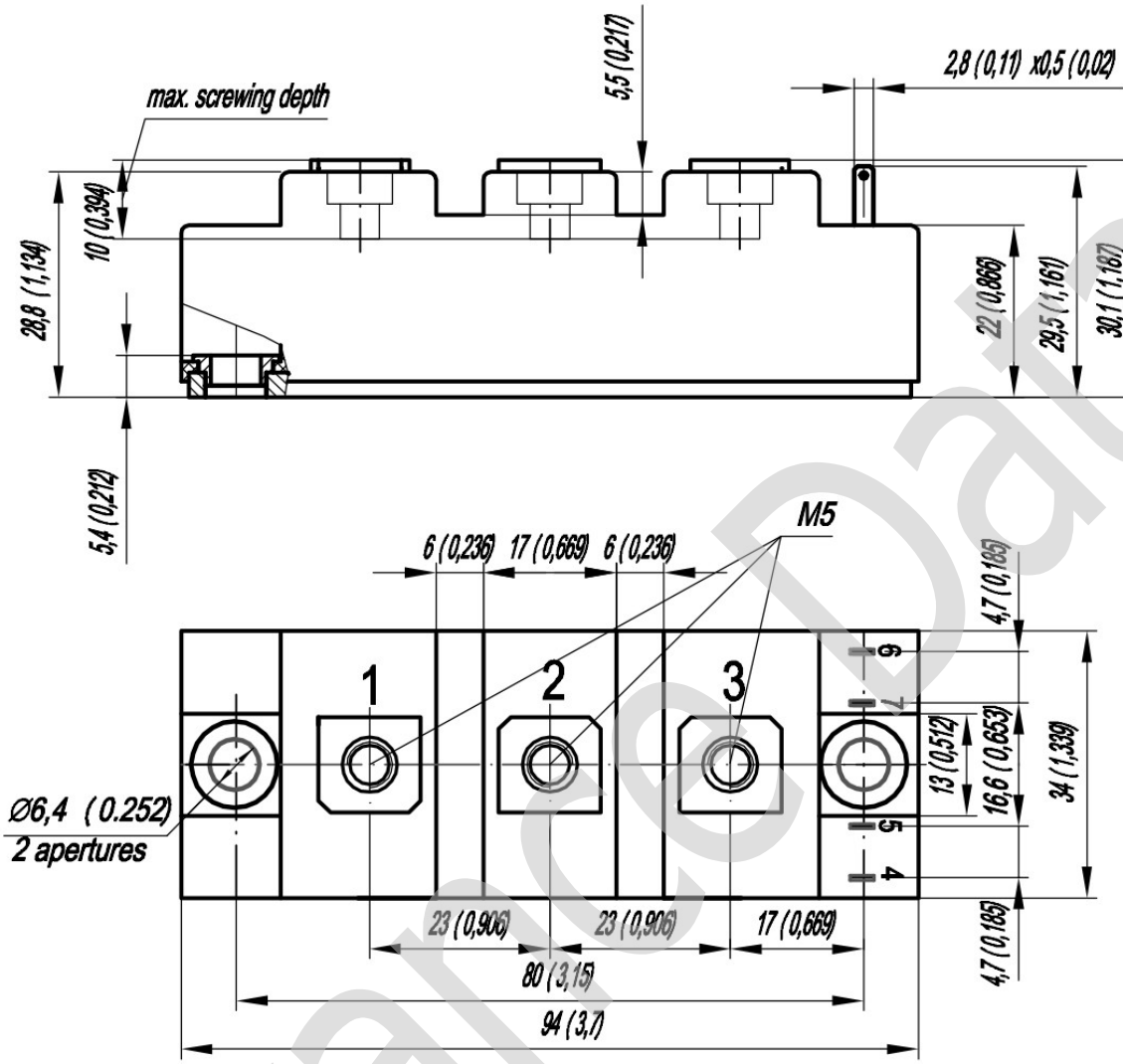
Definition	Symbol	Conditions		Value min.	Value typ.	Value max.	Unit
IGBT							
Collector-Emitter saturation voltage	V_{CEsat}	V_{GE} = +15 V; I_C = 150 A; t_u = 1000 µs.	T_{vj} = 25°C	1.40	1.60	1.90	V
			T_{vj} = 150°C	1.60	1.90	2.25	V
Gate-Emitter threshold voltage	$V_{GE(th)}$	I_C = 6 mA; V_{CE} = V_{GE}; T_{vj} = 25°C; t_u = 2 ms.		5.35	6.05	6.90	V
Collector-Emitter cut-off current	I_{CES}	V_{CE} = 1200 V; t_u = 50 ms; V_{GE} = 0.	T_{vj} = 25°C	-	11.00	100	µA
			T_{vj} = 150°C	-	1.00	2.00	mA
Gate-Emitter leakage current	I_{GES}	V_{CE} = 0; V_{GE} = ±20 V; T_{vj} = 25°C; t_u = 30 ms.		-	11.00	100	nA
Input capacitance	C_{ies}	V_{CE} = 10 V; V_{GE} = 0 V; f = 1 MHz; T_{vj} = 25°C.		-	87.00	-	nF
Output capacipance	C_{oes}			-	3.80	-	
Reverse transfer capacitance	C_{res}			-	0.90	-	
Total gate charge	Q_G	I_C = 150 A; V_{CE} = 600 V; V_{GE} = -8...+15 V.		-	-	-	нС
Internal gate resistance	R_{Gint}	T_{vj} = 25°C.		-	2.40	-	Ω
Turn-on delay time	$t_{d(on)}$	V_{CE} = 600 V; V_{GE} = ±15 V; $I_{C\,max}$ = 150 A; R_G = 2.2 Ω; L_s = 56 nH.	T_{vj} = 25°C	118	183	254	ns
			T_{vj} = 150°C	149	215	286	
Rise time	t_{ri}		T_{vj} = 25°C	40	52	65	ns
			T_{vj} = 150°C	45	60	76	
Turn-on energy	E_{on}		T_{vj} = 25°C	2.0	4.0	7.0	mJ
			T_{vj} = 150°C	5.0	8.0	13.0	
Turn-off delay time	$t_{d(off)}$		T_{vj} = 25°C	296	393	504	ns
			T_{vj} = 150°C	376	514	656	
Fall time	t_{fi}		T_{vj} = 25°C	159	227	304	ns
			T_{vj} = 150°C	223	297	390	
Turn-off energy	E_{off}		T_{vj} = 25°C	10.0	14.0	18.0	mJ
			T_{vj} = 150°C	14.0	20.0	25.0	
Collector-emitter threshold voltage	V_{CE0}	V_{GE} = +15 V; T_{vj} = 150°C; I_{CE1} = 38 A; I_{CE2} = 150 A; t_u = 1000 µs.		-	-	0.71	V
On-State slope resistance (IGBT)	r_{CE0}			-	-	9.39	mΩ
Thermal resistance junction to case	$R_{th(j-c)}$	DC; I_{CE} = 120±10 A; I_{test} = 0.5 A; V_{GE} = +15 V.		-	-	0.225	K/W
Inverse diode \ Freewheeling diode							
Forward voltage drop	V_F	I_F = 150 A; V_{GE} = 0; t_u = 1000 µs.	T_{vj} = 25°C	1.85	2.15	2.45	V
			T_{vj} = 150°C	1.90	2.20	2.55	V
Reverse recovery time	t_{rr}	V_{GE} = ±15 V; V_{CE} = 600 V; $I_{C\,max}$ = 150 A; L_s = 56 nH; $R_{G\,on}$ = 2.2 Ω.	T_{vj} = 25°C	80	105	131	ns
			T_{vj} = 150°C	119	242	401	ns
Peak reverse current	I_{RM}		T_{vj} = 25°C	80	105	142	A
			T_{vj} = 150°C	99	135	175	A
Recovered charge	Q_r		T_{vj} = 25°C	5.0	7.0	9.0	µC
			T_{vj} = 150°C	9.0	15.0	23.0	µC
Reverse recovery energy	E_{rec}		T_{vj} = 25°C	2.0	3.0	5.0	mJ
			T_{vj} = 150°C	6.0	9.0	12.0	mJ
Threshold voltage	$V_{(T0)}$	T_{vj} = 150°C; V_{GE} = 0; I_{F1} = 38 A; I_{F2} = 150 A; t_u = 1000 µs		-	-	0.87	V
Forward slope resistance	r_T			-	-	8.89	mΩ
Thermal resistance junction to case	$R_{th(JC-D)}$	DC; I_{CE} = 100±10 A; I_{test} = 0.5 A; V_{GE} = +15 V.		-	-	0.330	K/W

Module							
Pin resistance	R_{Pxy}	T_{vj} = 25°C.	R_{P12}	-	0.47	0.50	mΩ
			R_{P13}	-	0.66	0.66	
Parasitic inductance between terminals	L_{Pce}			-	27	-	nH
Thermal resistance case to heatsink	R_{thCH}	per module		-	0.02	0.04	K/W
Mounting torque for screws to heatsink	M_s	to heatsink M6		3.00	-	5.00	Nm
Mounting torque for terminal screws	M_t	to terminals M5		1.80	2.00	2.20	Nm
Weight	W			-	150	170	g

Notes:

- Insulating material operating temperature 125°C max;
- Case temperature 125°C max;
- The recommended operating junction temperature $T_{vj\ op}$ = - 40...+150°C.

Overall dimensions: Package type – FA



Part numbering guide

MIFA	-	HB	12	SM	-	150	N	
MIFA								IGBT module package type: FA
		HB						2 switches as Half-Bridge
		HC						1 switch as High-Side chopper
		LC						1 switch as Low-Side chopper
			12					Voltage rating (V_{CES}/100)
				SM				IGBT+FRD chipset modification
						150		Current Rating
							N	Climatic version: normal climate