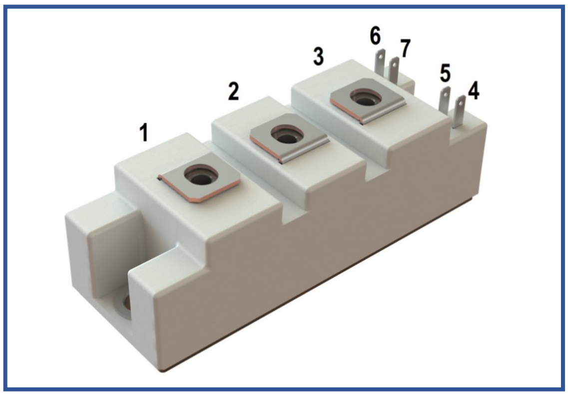
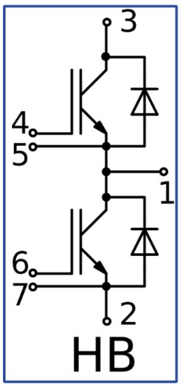
Industry standart 34mm IGBT module

1700 V 100 A





Chip features

- IGBT chip
  - Trench FS
  - 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.	1700	V
Maximum allowable collector current (continuous)	$I_{C\ 25}$	$T_{vj\ (max)}$ = 175°C; T_c = 25°C.	220	A
	$I_{C\ 80}$	$T_{vj\ (max)}$ = 175°C; T_c = 80°C.	100	A
Repetitive peak collector current*1	I_{CRM}	$I_{CRM} = 2$ x $I_{C\ nom}$; t_p = 1 ms.	200	A
Short-circuit duration	t_{psc}	T_{vj} = 25°C; V_{GE} = ±15 V; V_{CE} = 1000 V; $R_{G\ on} = R_{G\ off}$ = 2.2 Ω.	10	µs
		T_{vj} = 150°C; V_G = ±15 V; V_{CE} = 1000V; $R_{G\ on} = R_{G\ off}$ = 2.2 Ω.	10	
Gate-Emitter voltage	V_{GES}		±20	V
Junction operating temperature	$T_{vj\ (op)}$		-40…+150	ºC
Inverse diode \ Freewheeling diode				
Repetitive peak reverse voltage	V_{RRM}	V_{GE} = 0 V.	1700	V
Maximum allowable forward current (continuous)	$I_{F\ 25}$	$T_{vj\ (max)}$ = 175°C; T_c = 25°C.	114	A
	$I_{F\ 80}$	$T_{vj\ (max)}$ = 175°C; T_c = 80°C.	85	A
Repetitive peak forward current*1	I_{FRM}	$I_{FRM} = 2$ x $I_{F\ nom}$; t_p = 1 ms.	200	A
Junction operating temperature	$T_{vj\ (op)}$		-40…+150	°C
Module				
Storage temperature	T_{stg}		-40…+50	°C
Isolation voltage	U_{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 = 100 A; t_u = 1000 µs.	T_{vj} = 25°C	1.45	1.75	2.05	V
			T_{vj} = 150°C	1.75	2.10	2.45	V
Gate-Emitter threshold voltage	$V_{GE(th)}$	I_C = 4 mA; V_{CE} = V_{GE}; T_{vj} = 25°C; t_u = 2 ms.		4.60	5.40	6.20	V
Collector-Emitter cut-off current	I_{CES}	V_{CE} = 1700 V; t_u = 50 ms; V_{GE} = 0.	T_{vj} = 25°C	-	11.0	100	mA
			T_{vj} = 150°C	-	2.00	7.00	
Gate-Emitter leakage current	I_{GES}	V_{CE} = 0; V_{GE} = ±20 V; T_{vj} = 25°C; t_u = 30 ms.		-	10.0	100	nA
Input capacitance	C_{ies}	V_{CE} = 10 V; V_{GE} = 0 V; f = 1 MHz; T_{vj} = 25°C.		-	13.60	-	nF
Reverse transfer capacitance	C_{res}			-	0.40	-	nF
Total gate charge	Q_G	I_C = 100 A; V_{CE} = 920 V; V_{GE} = -15...+15 V.		-	750	850	nC
Internal gate resistance	R_{Gint}	T_{vj} = 25°C.		-	5.10	-	Ω
Turn-on delay time	$t_{d(on)}$	V_{CE} = 920 V; V_{GE} = ±15 V; $I_{C\ max}$ = 100 A; R_G = 2.2 Ω; L_s = 56 nH.	T_{vj} = 25°C	149	176	203	ns
			T_{vj} = 150°C	171	200	229	
Rise time	t_{ri}		T_{vj} = 25°C	27	43	59	ns
			T_{vj} = 150°C	37	48	59	
Turn-on energy	E_{on}		T_{vj} = 25°C	10.0	14	18.0	mJ
			T_{vj} = 150°C	17.0	22.0	29.0	
Turn-off delay time	$t_{d(off)}$		T_{vj} = 25°C	203	250	297	ns
			T_{vj} = 150°C	234	370	506	
Fall time	t_{fi}		T_{vj} = 25°C	472	608	744	ns
			T_{vj} = 150°C	671	844	1017	
Turn-off energy	E_{off}		T_{vj} = 25°C	15.0	22.0	29.0	mJ
			T_{vj} = 150°C	25.0	33.0	41.0	
Collector-emitter threshold voltage	V_{CE0}	V_{GE} = +15 V; T_{vj} = 150°C; I_{CE1} = 25 A; I_{CE2} = 100 A; t_u = 1000 µs.		0.88	0.95	1.02	V
On-State slope resistance (IGBT)	r_{CE0}			10.76	11.56	12.36	mΩ
Thermal resistance junction to case	$R_{th(j-c)}$	DC; I_{CE} = 100±10 A; I_{test} = 0.5 A; V_{GE} = +15 V.		-	0.164	0.181	K/W
Inverse diode \ Freewheeling diode							
Forward voltage drop	V_F	I_F = 100 A; V_{GE} = 0; t_u = 1000 µs.	T_{vj} = 25°C	1.65	1.95	2.25	V
			T_{vj} = 150°C	1.75	2.10	2.45	V
Reverse recovery time	t_{rr}	V_{GE} = ±15 V; V_{CE} = 920 V; $I_{C\ max}$ = 100 A; $R_{G\ on}$ = 2.2 Ω; L_s = 56 nH.	T_{vj} = 25°C	221	274	327	ns
			T_{vj} = 150°C	313	438	563	ns
Peak reverse current	I_{RM}		T_{vj} = 25°C	55	85	115	A
			T_{vj} = 150°C	60	95	130	A
Recovered charge	Q_r		T_{vj} = 25°C	5.0	11.0	17.0	µC
			T_{vj} = 150°C	13.0	21.0	29.0	µC
Reverse recovery energy	E_{rec}		T_{vj} = 25°C	4.0	8.0	12.0	mJ
			T_{vj} = 150°C	10.0	16.0	22.0	mJ
Threshold voltage	$V_{(T0)}$	T_{vj} = 150°C; V_{GE} = 0; I_{CE1} = 25 A; I_{CE2} = 100 A; t_u = 1000 µs		0.91	0.94	0.97	V
Forward slope resistance	r_T			11.21	11.87	12.53	mΩ
Thermal resistance junction to case	$R_{th(JC-D)}$	DC; I_{CE} = 80±10 A; I_{test} = 0.5 A; V_{GE} = +15 V.		-	0.476	0.542	K/W

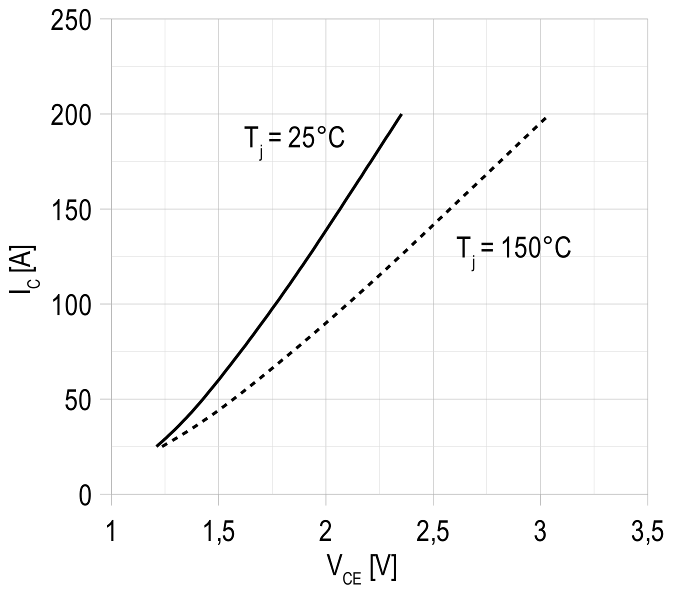
Module							
Pin resistance	R_{Pxy}	T_{vj} = 25°C.	R_{P12}	-	0.47	0.50	mΩ
			R_{P13}	-	0.66	0.66	
Parasitic inductance between terminals	L_{Pce}			-	27	-	nH
Thermal resistance case to heatsink	R_{thCH}	per module		-	0.02	0.04	K/W
Mounting torque for screws to heatsink	M_s	to heatsink M6		3.00	-	5.00	N*m
Mounting torque for terminal screws	M_t	to terminals M5		1.80	2.00	2.20	N*m
Weight	W			-	153	170	g

“ - ” — data will be refined as additional tests are conducted and statistics are collected.

Notes:

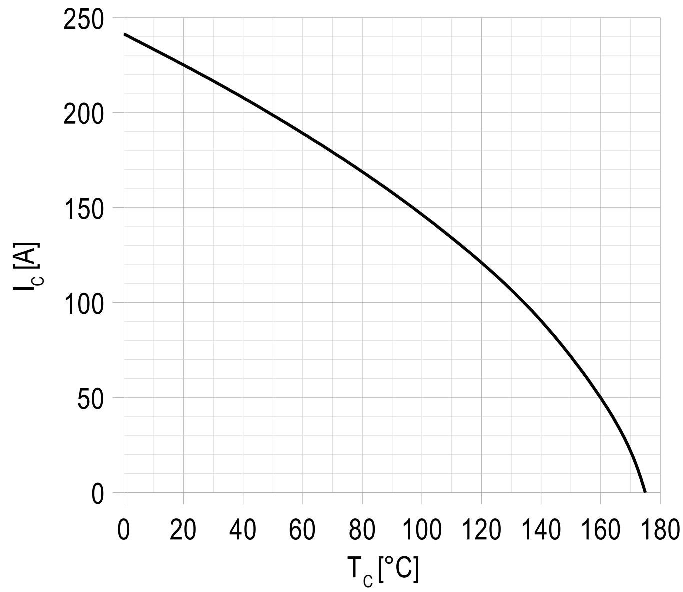
- Insulating material operating temperature 125°C max;
- Case temperature 125°C max;
- The recommended operating junction temperature $T_{vj\ op}$ = - 40...+150°C.

Chart 1 – typ. output characteristic, IGBT.



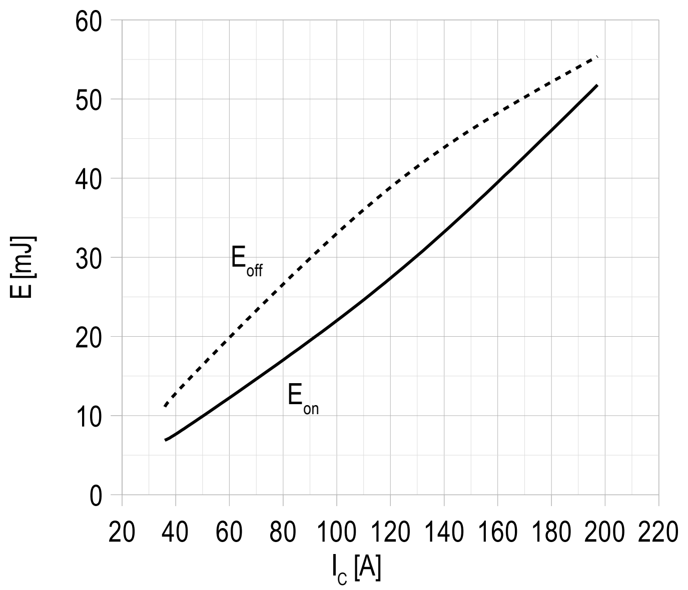
V_{GE} = +15 V.

Chart 2 – max. rated current vs temperature.



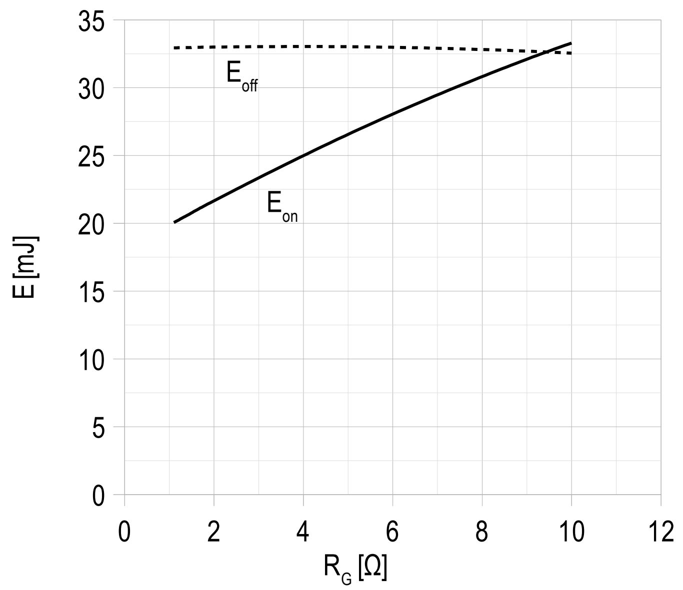
DC;
V_{GE} = +15 V;
$T_{vj\ (max)}$ = 175°C.

Chart 3 – typ. turn-on/-off energy vs rated current, IGBT.



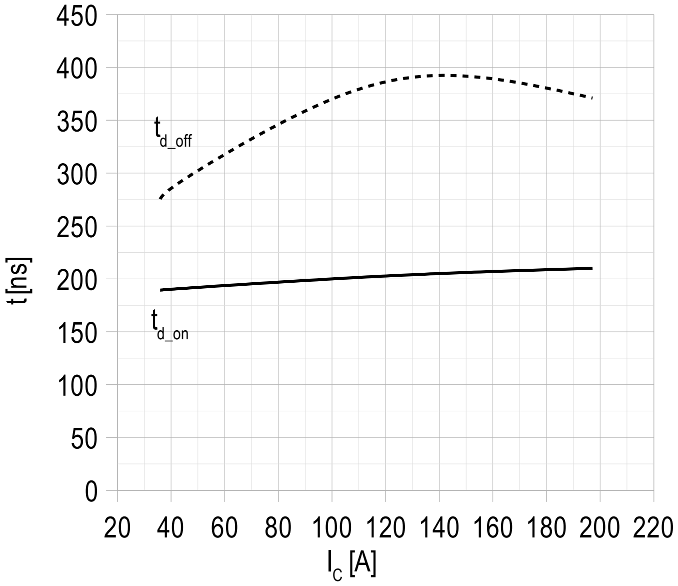
V_{CE} = 920 V;
V_{GE} = ±15 V;
R_G = 2.2 Ω;
L_s = 56 nH;
$T_{vj\ (max)}$ = 150°C.

Chart 4 – typ. turn-on/-off energy vs gate resistance, IGBT.



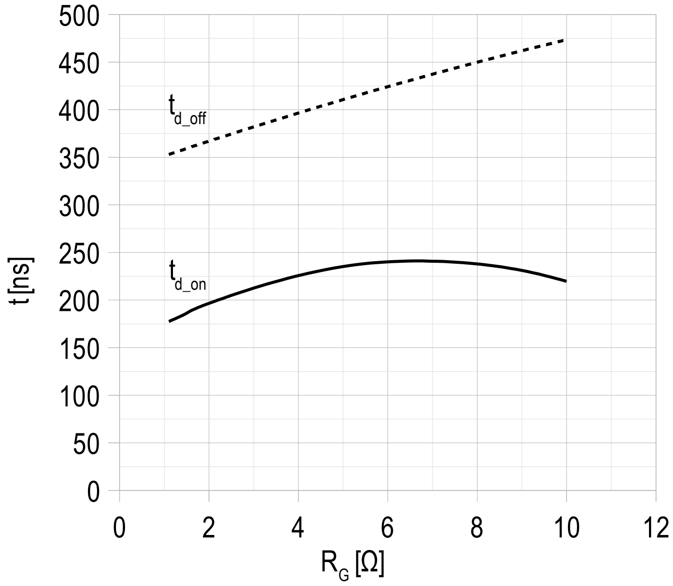
V_{CE} = 920 V;
V_{GE} = ±15 V;
I_{Cmax} = 100 A;
L_s = 56 nH;
$T_{vj\ (max)}$ = 150°C.

Chart 5 – typ. switching times vs rated current, IGBT.



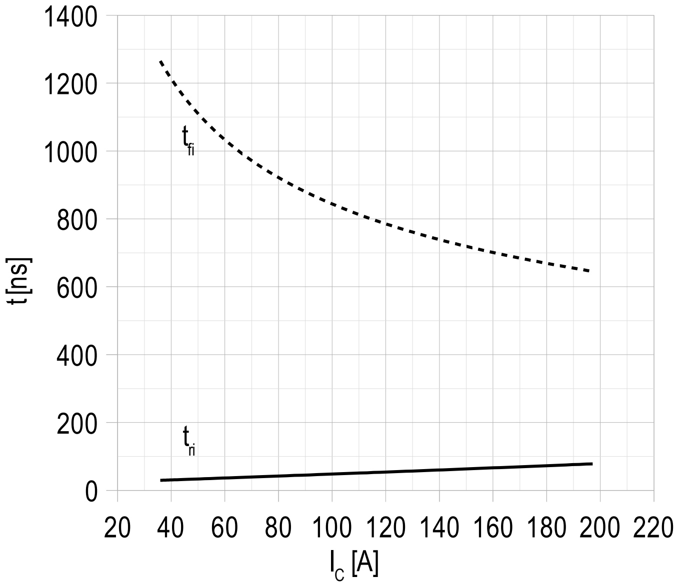
V_{CE} = 920 V;
V_{GE} = ±15 V;
R_G = 2.2 Ω;
L_s = 56 nH;
$T_{vj\,(max)}$ = 150°C.

Chart 6 – typ. switching times vs gate resistance, IGBT.



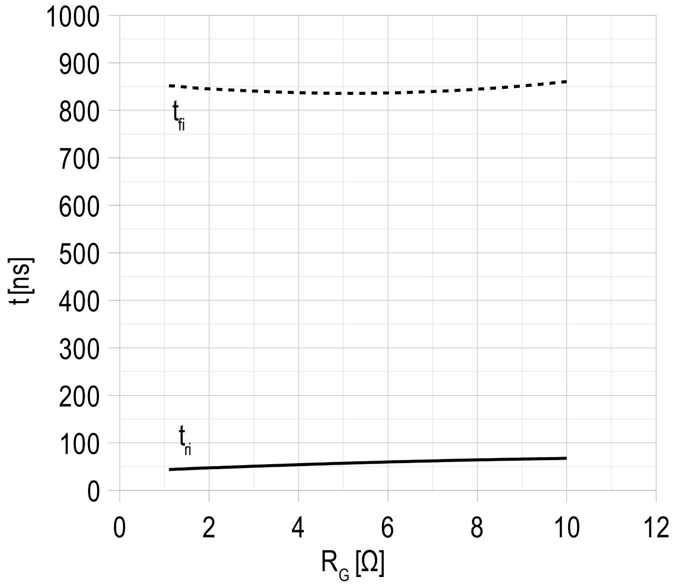
V_{CE} = 920 V;
V_{GE} = ±15 V;
$I_{C\,max}$ = 100 A;
L_s = 56 nH;
$T_{vj\,(max)}$ = 150°C.

Chart 7 – typ. switching times vs rated current, IGBT.



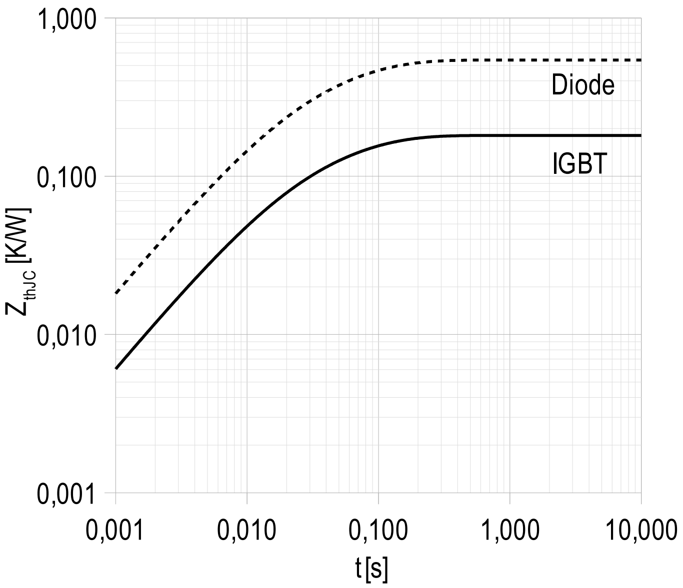
V_{CE} = 920 V;
V_{GE} = ±15 V;
R_G = 2.2 Ω;
L_s = 56 nH;
$T_{vj\,(max)}$ = 150°C.

Chart 8 – typ. switching times vs gate resistance, IGBT.



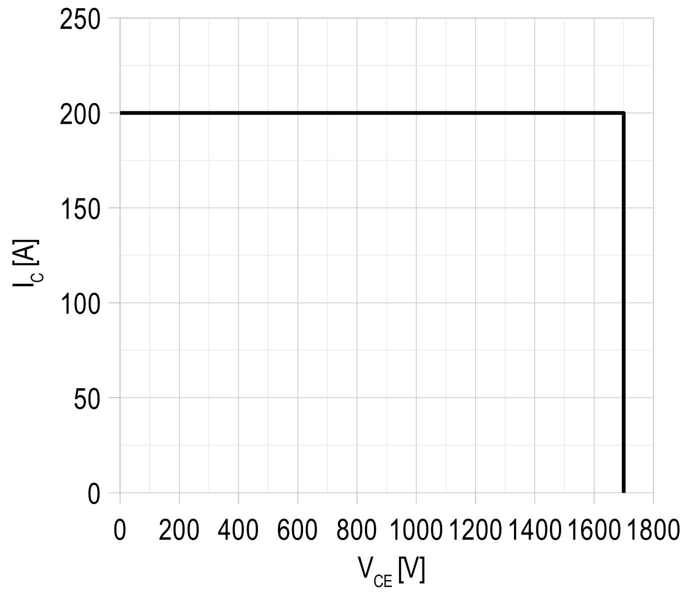
V_{CE} = 920 V;
V_{GE} = ±15 V;
$I_{C\,max}$ = 100 A;
L_s = 56 nH.
$T_{vj\,(max)}$ = 150°C.

Chart 9 – max. transient thermal impedance .



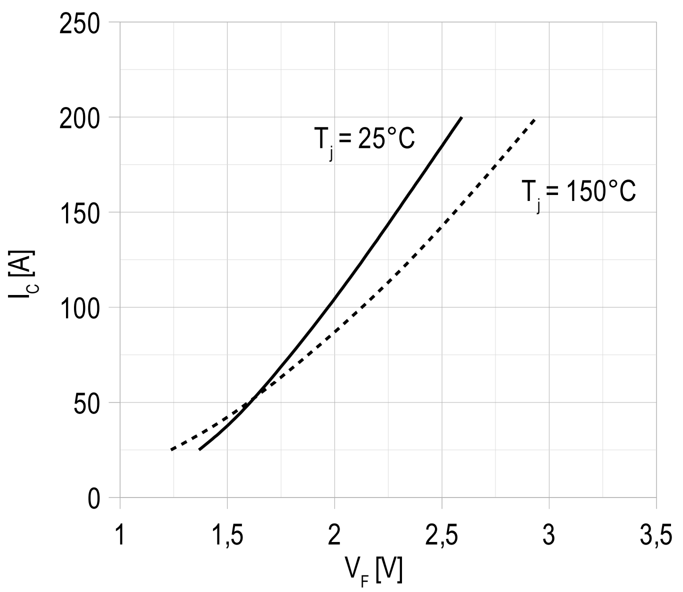
Single pulse;
V_{GE} = +15 V.

Chart 10 – RBSOA.



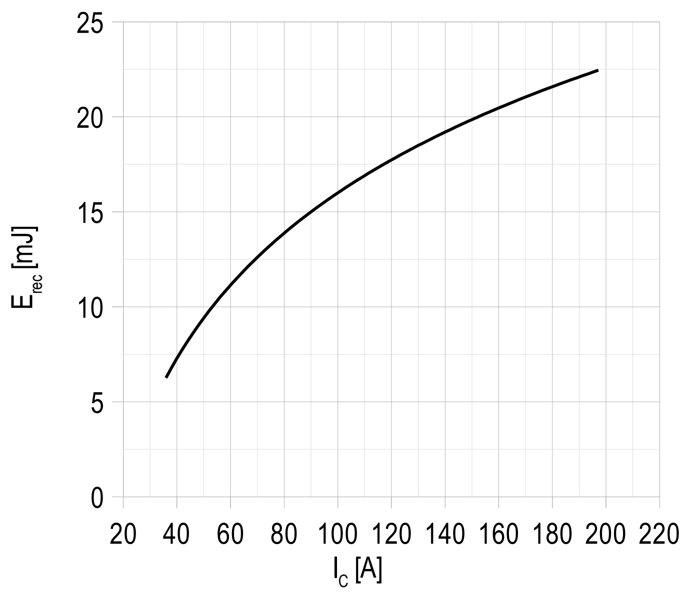
$V_{CE\ max}$ = 1700 V;
V_{GE} = ±15 V;
$I_{C\ max}$ = 2*$I_{C\ nom}$;
R_G = 2.2 Ω;
L_s = 56 nH.

Chart 11 – typ. output characteristic, FRD.



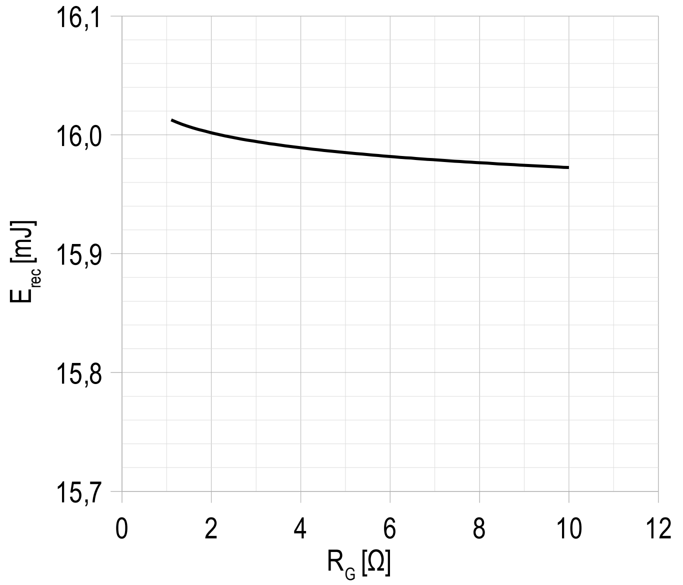
V_{GE} = 0 V.

Chart 12 – typ. switching losses vs rated current, FRD.



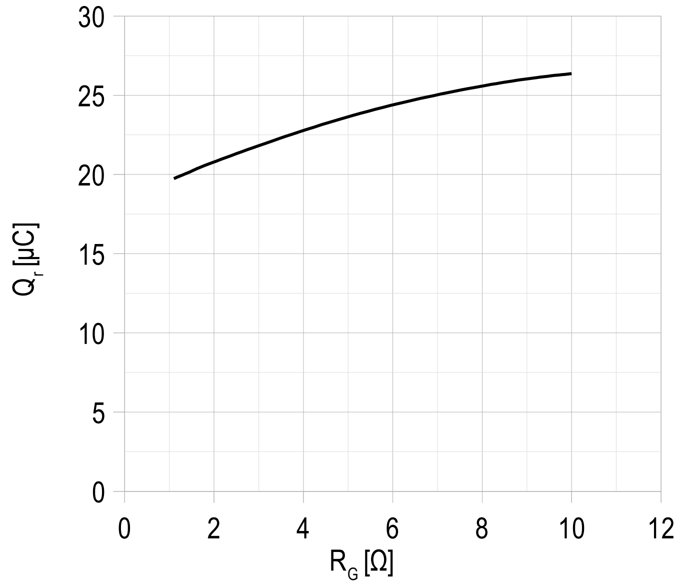
V_{GE} = ±15 V;
V_{CE} = 920 V;
L_s = 56 nH;
$R_{G\ on}$ = 2.2 Ω;
$T_{vj\ (max)}$ = 150°C.

Chart 13 – typ. switching losses vs gate resistance, FRD.



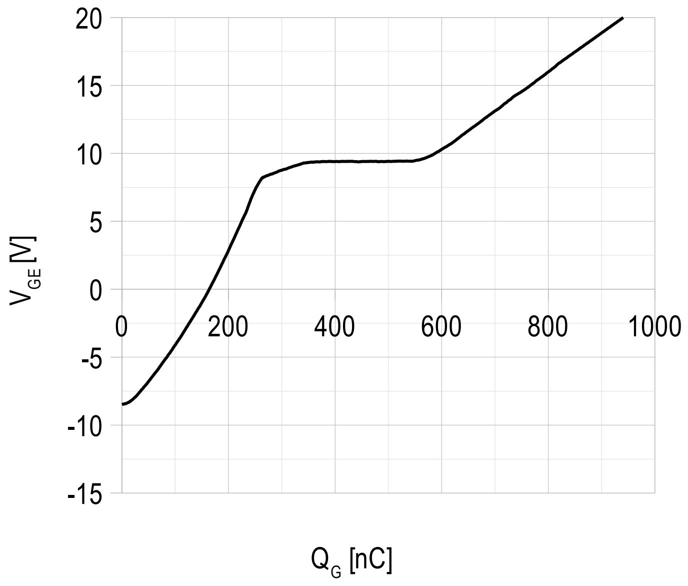
V_{GE} = ±15 V;
V_{CE} = 920 V;
$I_{C\,max}$ = 100 A;
L_s = 56 nH;
$T_{vj\,(max)}$ = 150°C.

Chart 14 – typ. reverse recovered charge vs gate resistance, FRD.



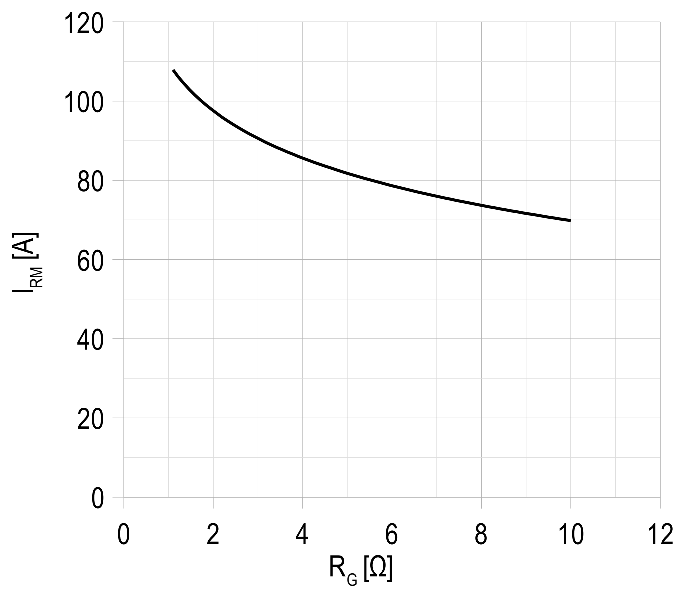
V_{GE} = ±15 V;
V_{CE} = 920 V;
$I_{C\,max}$ = 100 A;
L_s = 56 nH;
$T_{vj\,(max)}$ = 150°C.

Chart 15 – typ. gate charge characteristic.



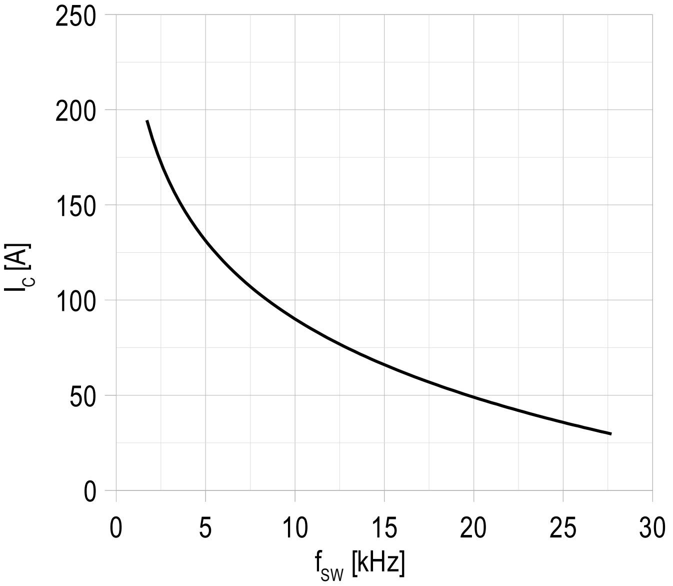
I_C = 100 A;
V_{CE} = 920 V;
V_{GE} = - 8÷15 V.

Chart 16 – typ. reverse recovery current vs gate resistance FRD.



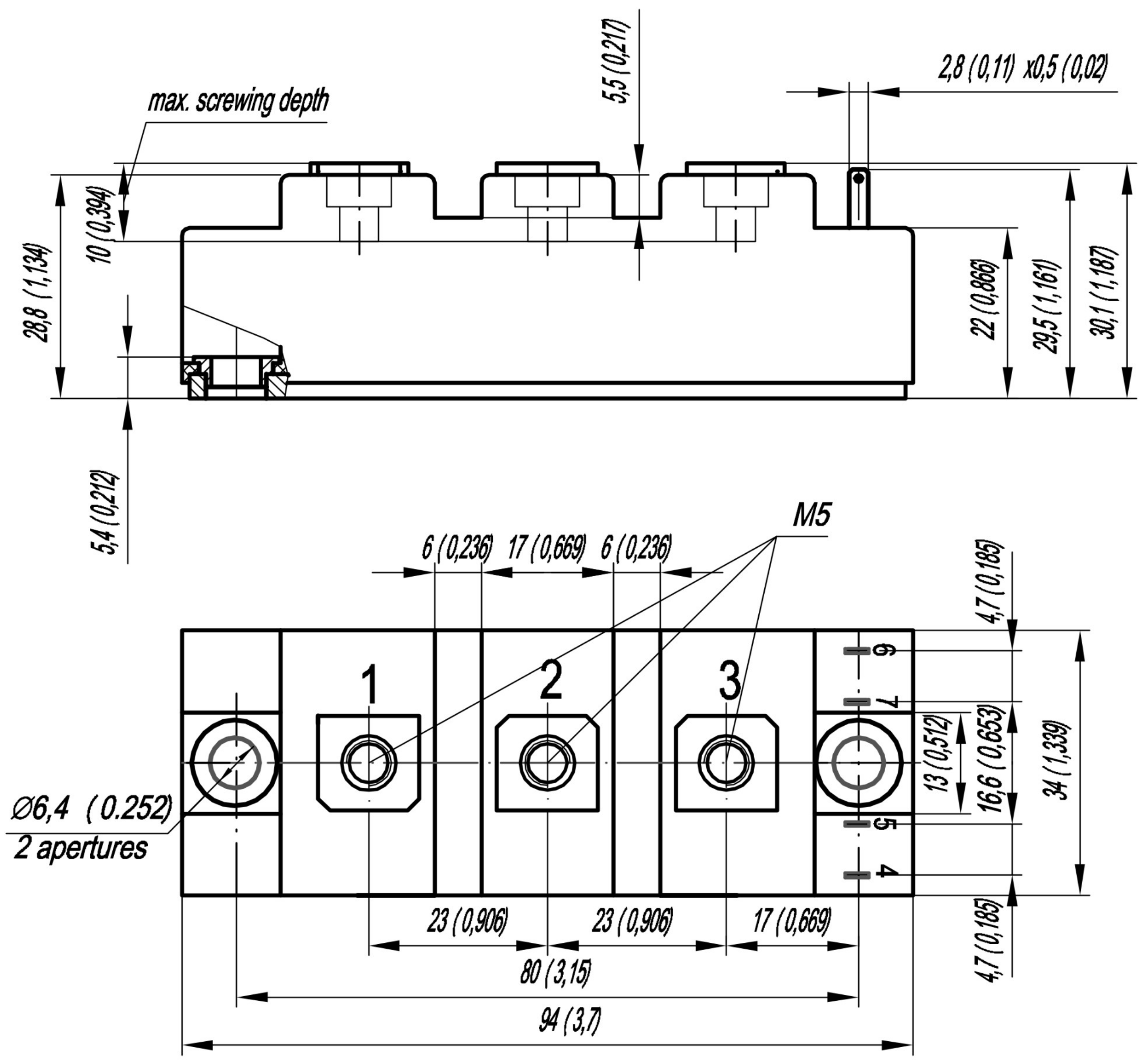
V_{CE} = 920 V;
V_{GE} = ±15 V;
L_s = 56 nH.
$T_{vj\,(max)}$ = 150°C.

Chart 17 – max. rated current vs frequency.



Duty cycle 50%;
V_{CE} = 920 V;
T_c = 80 °C;
$T_{vj\,(max)}$ = 175 °C.

Overall dimensions: Package type – FA



Part numbering guide

MIFA	-	HB	17	SA	-	100	N	
MIFA								IGBT module package type: FA
		HB						2 switches as Half-Bridge
			17					Voltage rating (V_{CES}/100)
				SA				IGBT+FRD chipset modification
						100		Current Rating
							N	Climatic version: normal climate