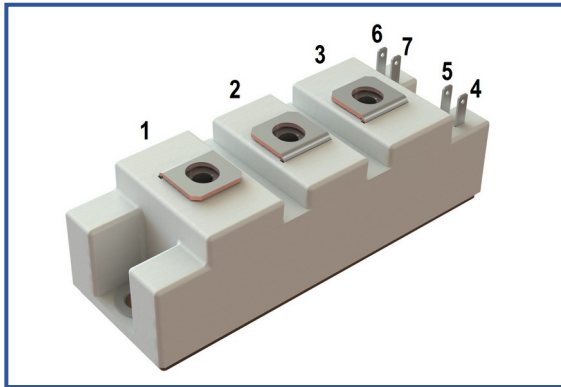


Industry standard 34mm IGBT module

1700 V 75 A


Chip features

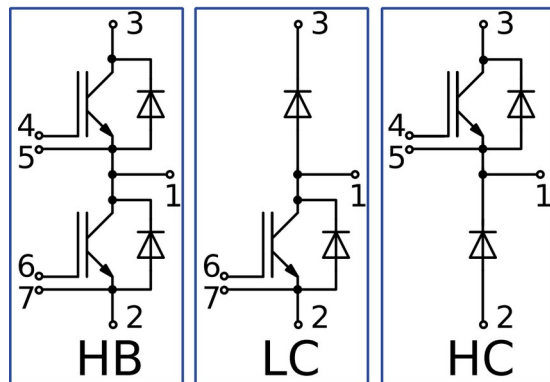
- IGBT chip
 - Trench FS
 - low $V_{CE(sat)}$ value
 - 10 μ s short circuit of 150°C
 - square RBSOA of 2xlc
 - low EMI
- FRD chip
 - fast and soft reverse recovery
 - low voltage drop

Design features

- copper baseplate
- Al_2O_3 DBC substrate
- ultrasonically welded power terminals
- Improved thermal cycling
- RoHS compliant
- UL certified file-No. E255404

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
Collector current (nominal)	$I_{C\ nom}$		75	A
Collector current (maximum continuous)	$I_{C\ 25}$	$T_{vj\ (max)} = 175^{\circ}C; T_c = 25^{\circ}C.$	112	A
	$I_{C\ 80}$	$T_{vj\ (max)} = 175^{\circ}C; T_c = 80^{\circ}C.$	75	A
Repetitive peak collector current*1	I_{CRM}	$I_{CRM} = 3 \times I_{C\ nom}; t_p = 1\ ms.$	225	A
Short-circuit duration	t_{psc}	$T_{vj} = 25^{\circ}C; V_{GE} = \pm 15\ V; V_{CE} = 720\ V;$ $R_{G\ on} = R_{G\ off} = 2.2\ \Omega; I_{Cmax} < 750\ A.$	10	μ s
		$T_{vj} = 150^{\circ}C; V_G = \pm 15\ V; V_{CE} = 720V;$ $R_{G\ on} = R_{G\ off} = 2.2\ \Omega; I_{Cmax} < 620\ A.$	10	
Gate-Emitter voltage	V_{GES}		± 20	V
Junction operating temperature	$T_{vj\ (op)}$		-40...+150	$^{\circ}C$
Inverse diode \ Freewheeling diode				
Repetitive peak reverse voltage	V_{RRM}	$V_{GE} = 0\ V.$	1700	V
Forward current (nominal)	$I_{F\ nom}$		75	A
Forward current (maximum continuous)	$I_{F\ 25}$	$T_{vj\ (max)} = 175^{\circ}C; T_c = 25^{\circ}C.$	87	A
	$I_{F\ 80}$	$T_{vj\ (max)} = 175^{\circ}C; T_c = 80^{\circ}C.$	65	A
Repetitive peak forward current*1	I_{FRM}	$I_{FRM} = 3 \times I_{F\ nom}; t_p = 1\ ms.$	225	A
Junction operating temperature	$T_{vj\ (op)}$		-40...+150	$^{\circ}C$
Module				
Storage temperature	T_{stg}		-55...+50	$^{\circ}C$
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			Unit.		
			min.	typ.	max.			
IGBT								
Collector-Emitter saturation voltage	V_{CEsat}	$V_{GE} = +15\text{ V}; I_C = 75\text{ A};$ $t_u = 1000\ \mu\text{s}.$	$T_{vj} = 25^\circ\text{C}$ $T_{vj} = 150^\circ\text{C}$	2.06 2.79	2.08 2.89	2.25 3.24	V V	
Gate-Emitter threshold voltage	$V_{GE(th)}$	$I_C = 3\text{ mA}; V_{CE} = V_{GE}; T_{vj} = 25^\circ\text{C};$ $t_u = 2\text{ ms}.$		5.31	5.62	6.33	V	
Collector-Emitter cut-off current	I_{CES}	$V_{CE} = 1700\text{ V};$ $t_u = 50\text{ ms}; V_{GE} = 0.$	$T_{vj} = 25^\circ\text{C}$ $T_{vj} = 150^\circ\text{C}$	3.95 0.34	5.66 0.44	300 2.00	μA mA	
Gate-Emitter leakage current	I_{GES}	$V_{CE} = 0; V_{GE} = \pm 20\text{ V}; T_{vj} = 25^\circ\text{C};$ $t_u = 30\text{ ms}.$		2.30	15.2	500	nA	
Input capacitance	C_{ies}	$V_{CE} = 10\text{ V}; V_{GE} = 0\text{ V};$ $f = 1\text{ MHz}; T_{vj} = 25^\circ\text{C}.$		-	7.50	-	nF	
Output capacitance	C_{oes}			-	0.40	-	nF	
Reverse transfer capacitance	C_{res}			-	0.50	-	nF	
Total gate charge	Q_G	$I_C = 75\text{ A}; V_{CE} = 920\text{ V};$ $V_{GE} = -8 \div 15\text{ V}.$		-	866	924	nC	
Internal gate resistance	R_{Gint}	$T_{vj} = 25^\circ\text{C}.$		-	10.0	-	Ω	
Turn-on delay time	$t_{d(on)}$	$V_{CE} = 920\text{ V};$ $V_{GE} = \pm 15\text{ V};$ $I_{Cmax} = 75\text{ A};$ $R_G = 2.2\ \Omega;$ $L = 56\text{ nH}.$	$T_{vj} = 25^\circ\text{C}$ $T_{vj} = 150^\circ\text{C}$	328 376	336 384	430 490	ns	
Rise time	t_{ri}		$T_{vj} = 25^\circ\text{C}$ $T_{vj} = 150^\circ\text{C}$	30.0 35.0	32.0 37.0	40.0 50.0	ns	
Turn-on energy	E_{on}		$T_{vj} = 25^\circ\text{C}$ $T_{vj} = 150^\circ\text{C}$	9.00 16.0	10.0 17.0	16.0 23.0	mJ	
Turn-off delay time	$t_{d(off)}$		$T_{vj} = 25^\circ\text{C}$ $T_{vj} = 150^\circ\text{C}$	360 430	370 430	430 490	ns	
Fall time	t_{fi}		$T_{vj} = 25^\circ\text{C}$ $T_{vj} = 150^\circ\text{C}$	588 792	616 864	1050 1100	ns	
Turn-off energy	E_{off}		$T_{vj} = 25^\circ\text{C}$ $T_{vj} = 150^\circ\text{C}$	15.0 21.0	16.0 23.0	23.0 30.0	mJ	
Collector-emitter threshold voltage	V_{CE0}		$V_{GE} = +15\text{ V}; T_{vj} = 150^\circ\text{C};$		1.02	1.05	1.10	V
On-State slope resistance (IGBT)	r_{CE0}		$I_{CE1} = 19\text{ A}; I_{CE2} = 75\text{ A};$ $t_u = 1000\ \mu\text{s}.$		23.2	24.6	27.5	m Ω
Thermal resistance junction to case	$R_{th(j-c)}$		DC; $I_{CE} = 80 \pm 10\text{ A}; I_{test} = 0.5\text{ A};$ $V_{GE} = +15\text{ V}.$		-	0.290	0.320	K/W
Inverse diode \ Freewheeling diode								
Forward voltage drop	V_F	$I_F = 75\text{ A};$ $V_{GE} = 0; t_u = 1000\ \mu\text{s}.$	$T_{vj} = 25^\circ\text{C}$ $T_{vj} = 150^\circ\text{C}$	1.83 2.13	1.86 2.26	2.00 2.50	V V	
Reverse recovery time	t_{rr}	$V_{GE} = \pm 15\text{ V};$ $V_{CE} = 920\text{ V};$ $I_{Cmax} = 75\text{ A};$ $R_{Gon} = 2.2\ \Omega;$ $L = 56\text{ nH}.$	$T_{vj} = 25^\circ\text{C}$ $T_{vj} = 150^\circ\text{C}$	134 245	163 304	220 380	ns ns	
Repetitive peak reverse current	I_{RRM}		$T_{vj} = 25^\circ\text{C}$ $T_{vj} = 150^\circ\text{C}$	99.0 107	103 112	140 140	A A	
Reverse recovered charge	Q_{rr}		$T_{vj} = 25^\circ\text{C}$ $T_{vj} = 150^\circ\text{C}$	8.00 13.0	9.00 15.0	12.0 20.0	μC μC	
Reverse recovery energy	E_{rec}		$T_{vj} = 25^\circ\text{C}$ $T_{vj} = 150^\circ\text{C}$	7.00 13.0	7.00 14.0	10.0 17.0	mJ mJ	
Threshold voltage	$V_{(TO)}$		$T_{vj} = 150^\circ\text{C}; V_{GE} = 0; I_{CE1} = 19\text{ A};$		0.90	0.93	1.02	V
Forward slope resistance	r_T		$I_{CE2} = 75\text{ A}; t_u = 1000\ \mu\text{s}$		16.1	17.6	20.0	m Ω
Thermal resistance junction to case	$R_{th(jc-D)}$	DC; $I_{CE} = 80 \pm 10\text{ A}; I_{test} = 1.0\text{ A};$ $V_{GE} = +15\text{ V}.$		-	0.582	0.630	K/W	

Module							
Pin resistance	R_{Pxy}	$T_{vj} = 25^{\circ}\text{C}.$	R_{P12}	-	0.47	0.50	m Ω
			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	-	5	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

Notes:

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

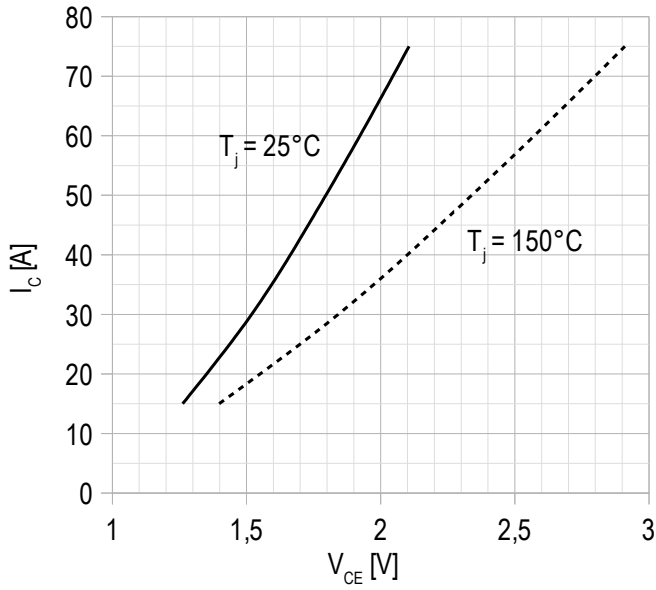
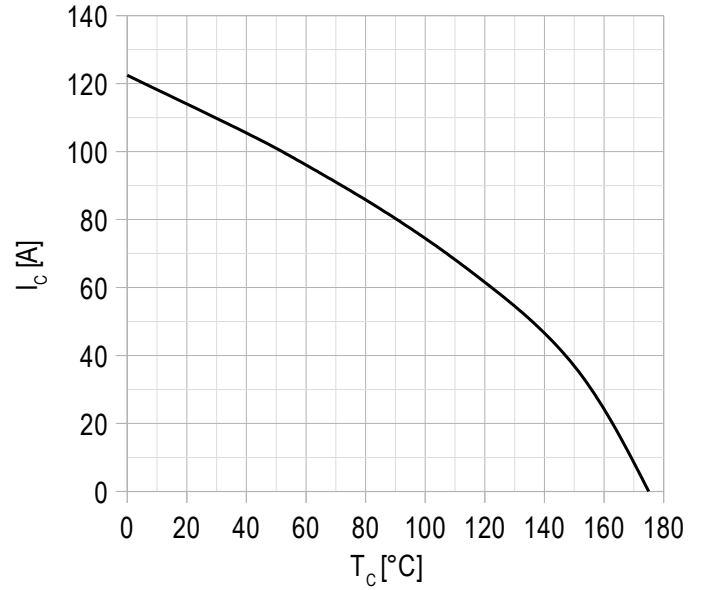
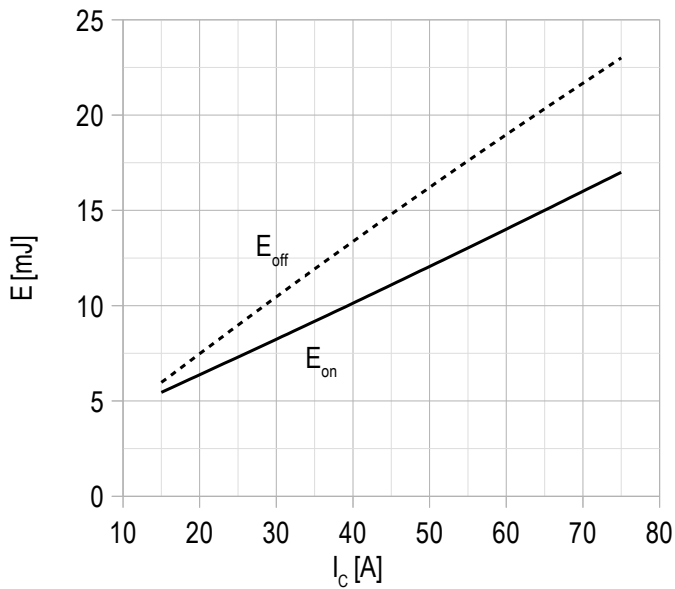
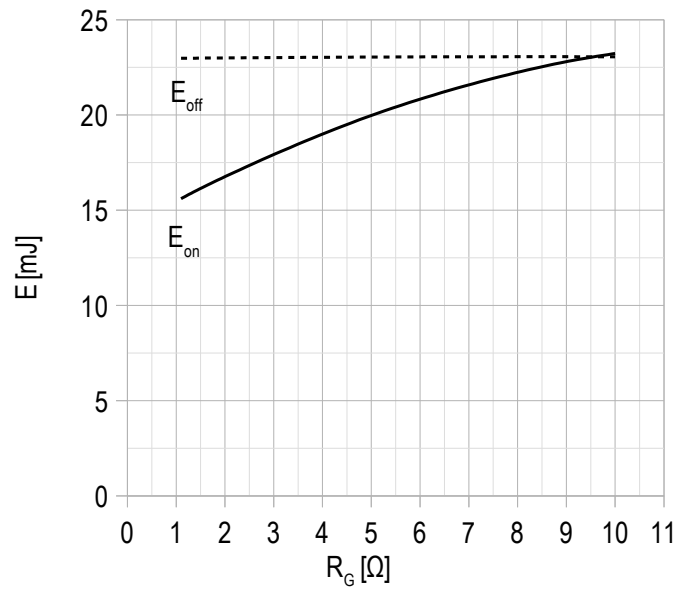
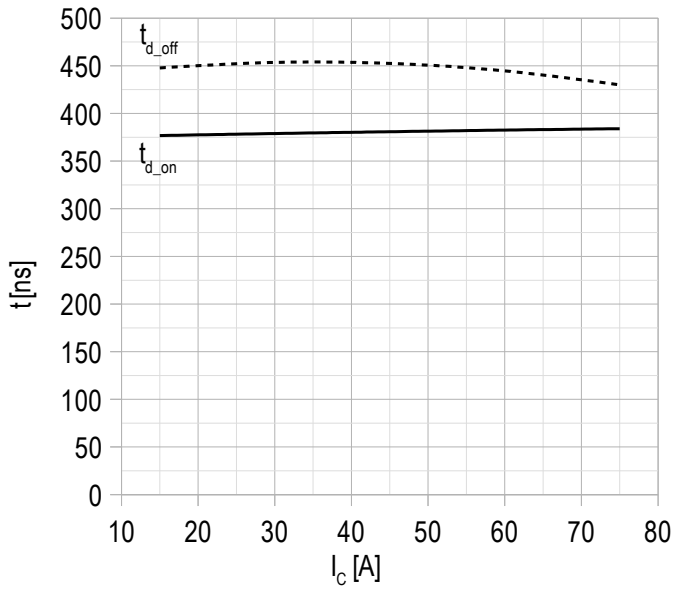
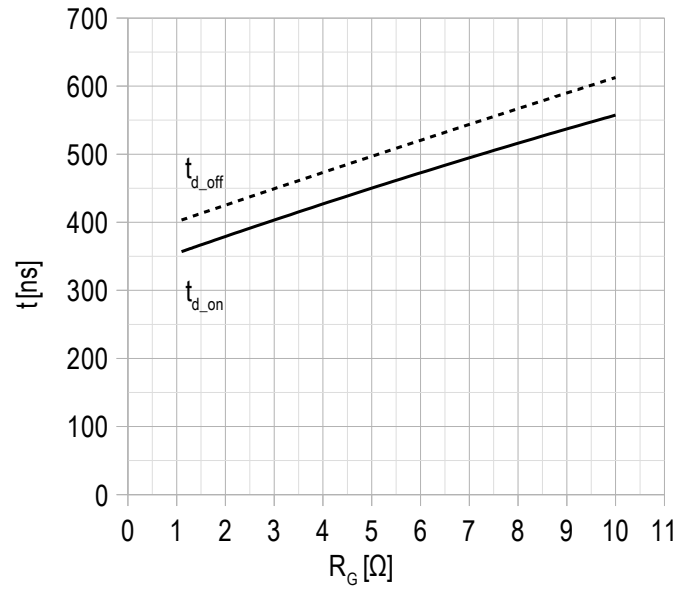
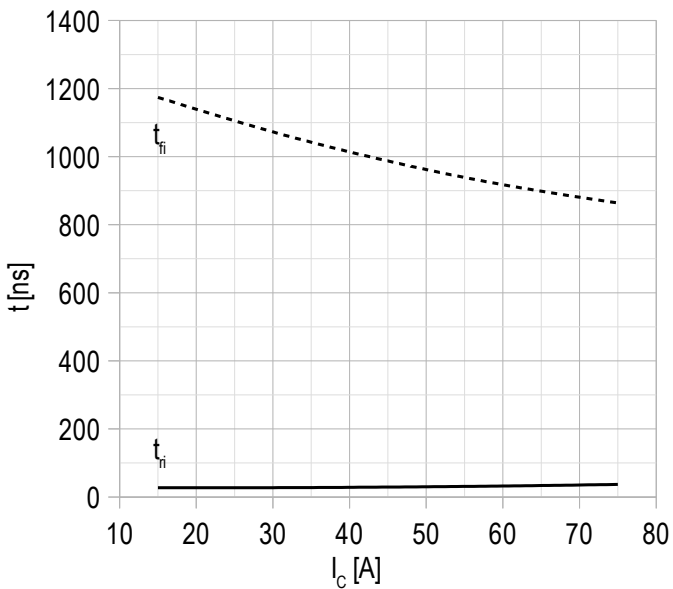
Chart 1 – typ. output characteristic, IGBT.

 $V_{GE} = +15 \text{ V.}$
Chart 2 – max. rated current vs temperature.

 DC;
 $V_{GE} = +15 \text{ V;}$
 $T_{vj(max)} = 175^\circ\text{C.}$
Chart 3 – typ. turn-on/off energy vs rated current, IGBT.

 $V_{CE} = 920 \text{ V;}$
 $V_{GE} = \pm 15 \text{ V;}$
 $R_G = 2.2 \Omega;$
 $L = 56 \text{ nH;}$
 $T_{vj(max)} = 150^\circ\text{C.}$
Chart 4 – typ. turn-on/off energy vs gate resistance, IGBT.

 $V_{CE} = 920 \text{ V;}$
 $V_{GE} = \pm 15 \text{ V;}$
 $I_{Cmax} = 75 \text{ A;}$
 $L = 56 \text{ nH;}$
 $T_{vj(max)} = 150^\circ\text{C.}$

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


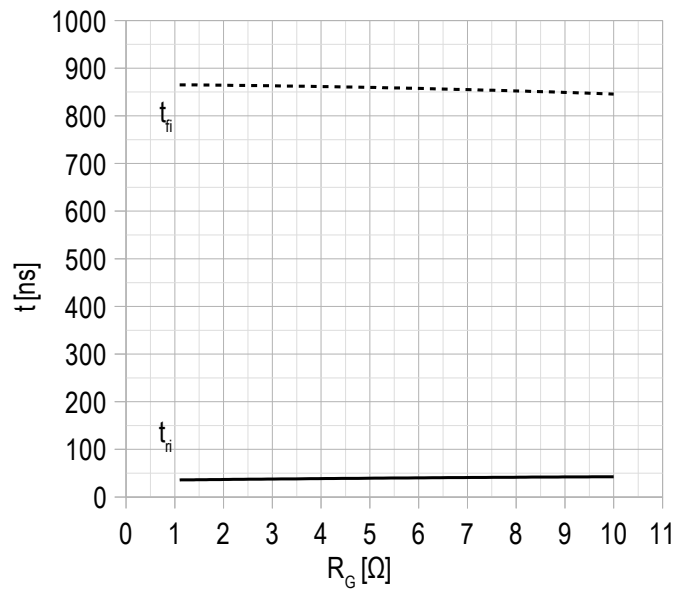
$V_{CE} = 920 \text{ V};$
 $V_{GE} = \pm 15 \text{ V};$
 $R_G = 2.2 \text{ } \Omega;$
 $L = 56 \text{ nH};$
 $T_{vj(max)} = 150^\circ\text{C}.$

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


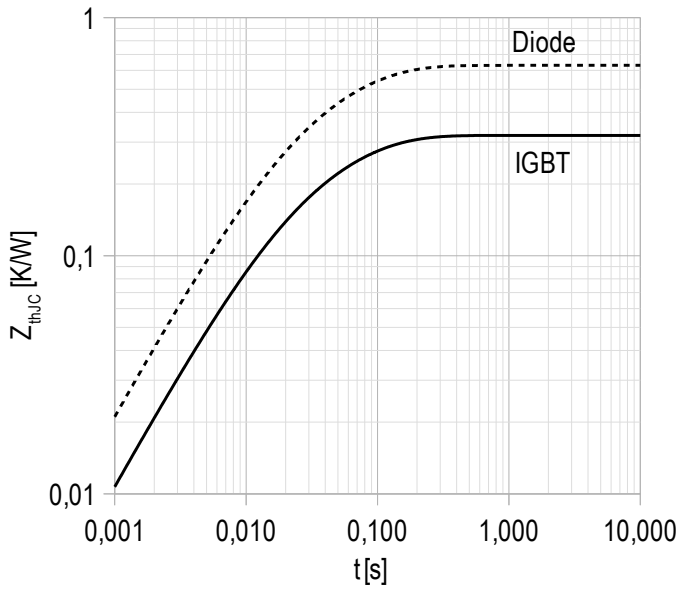
$V_{CE} = 920 \text{ V};$
 $V_{GE} = \pm 15 \text{ V};$
 $I_{Cmax} = 75 \text{ A};$
 $L = 56 \text{ nH};$
 $T_{vj(max)} = 150^\circ\text{C}.$

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


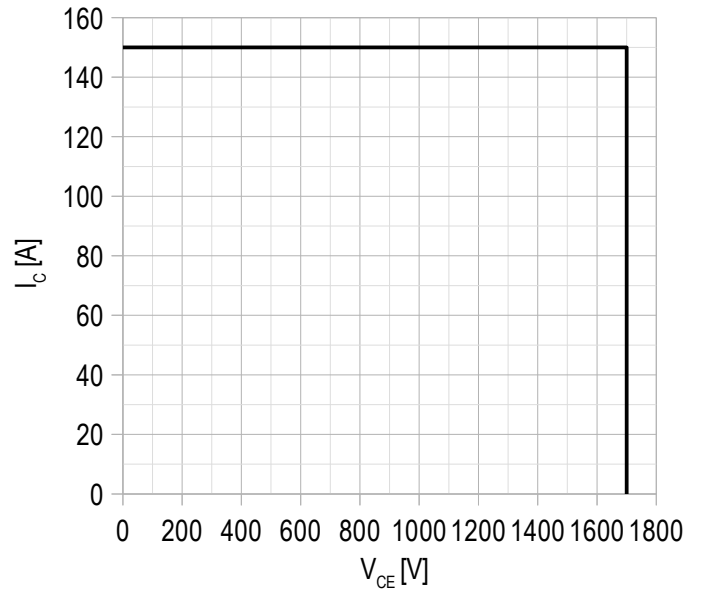
$V_{CE} = 920 \text{ V};$
 $V_{GE} = \pm 15 \text{ V};$
 $R_G = 2.2 \text{ } \Omega;$
 $L = 56 \text{ nH}.$
 $T_{vj(max)} = 150^\circ\text{C}.$

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


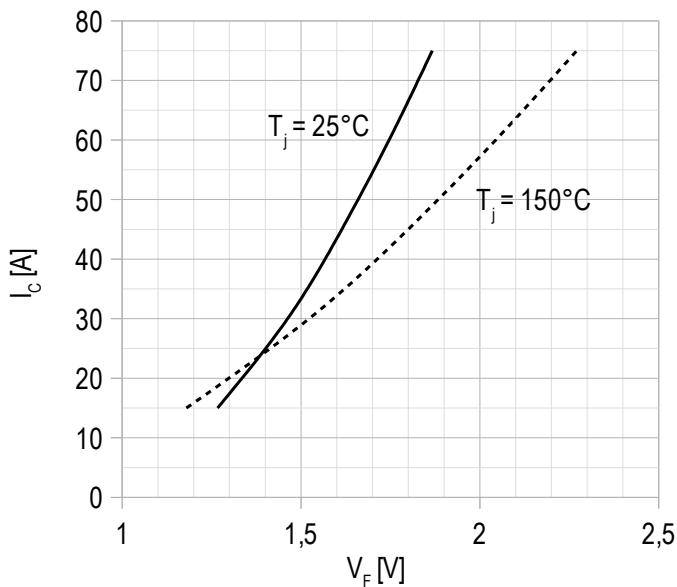
$V_{CE} = 920 \text{ V};$
 $V_{GE} = \pm 15 \text{ V};$
 $I_{Cmax} = 75 \text{ A};$
 $L = 56 \text{ nH}.$
 $T_{vj(max)} = 150^\circ\text{C}.$

Chart 9 – max. transient thermal impedance.


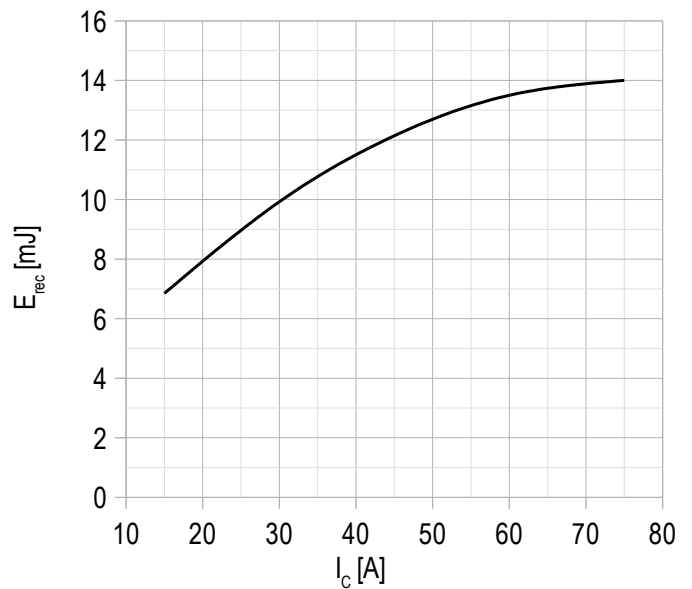
Single pulse;
 $V_{GE} = +15\text{ V}$.

Chart 10 – RBSOA.


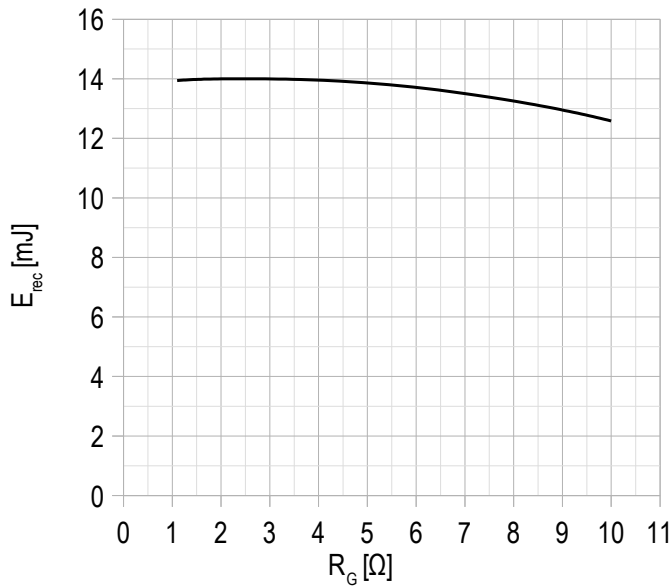
$V_{CE\text{ max}} = 1700\text{ V}$;
 $V_{GE} = \pm 15\text{ V}$;
 $I_{c\text{ max}} = 2 \cdot I_{c\text{ nom}}$;
 $R_G = 2.2\ \Omega$;
 $L = 56\text{ nH}$.

Chart 11 – typ. output characteristic, FRD.


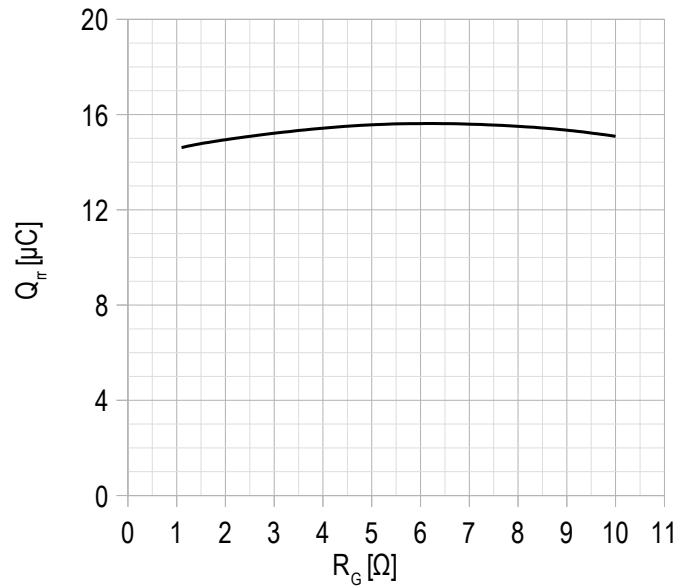
$V_{GE} = +15\text{ V}$.

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


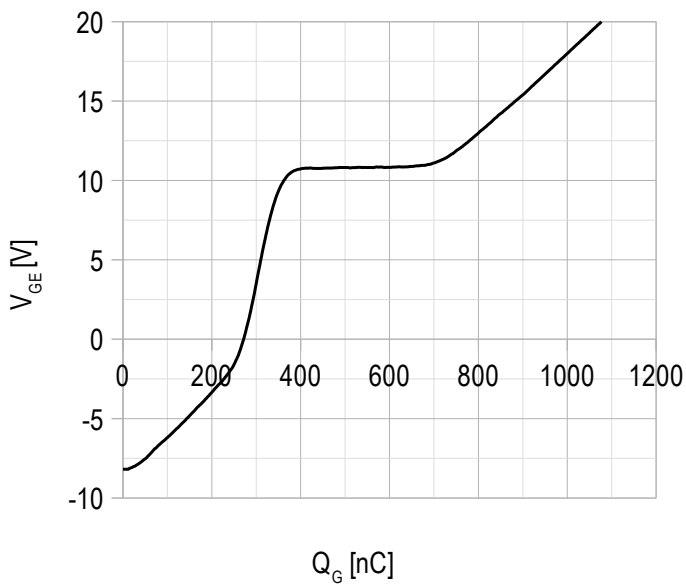
$U_{GE} = \pm 15\text{ V}$;
 $U_{CE} = 920\text{ V}$;
 $L = 56\text{ nH}$;
 $R_{G\text{ on}} = 2.2\ \Omega$;
 $T_{vj\text{ (max)}} = 150^\circ\text{C}$.

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


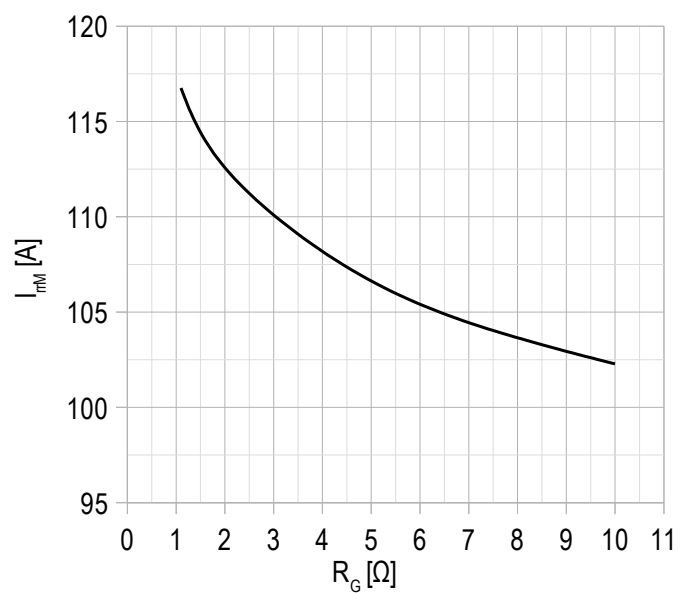
$V_{GE} = \pm 15$ V;
 $V_{CE} = 920$ V;
 $I_{C\ max} = 75$ A;
 $L = 56$ nH;
 $T_{vj\ (max)} = 150^\circ\text{C}$.

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


$V_{GE} = \pm 15$ V;
 $V_{CE} = 920$ V;
 $I_{C\ max} = 75$ A;
 $L = 56$ nH;
 $T_{vj\ (max)} = 150^\circ\text{C}$.

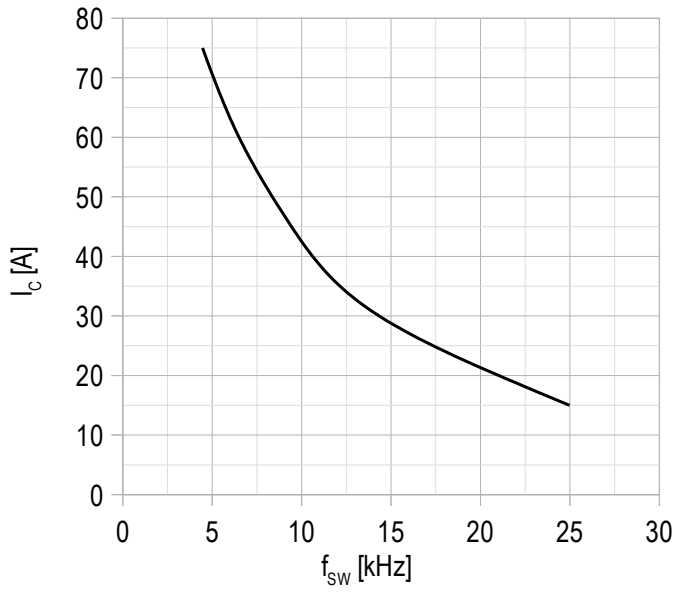
Chart 15 – typ. gate charge characteristic.


$I_C = 75$ A;
 $V_{CE} = 920$ V;
 $V_{GE} = -8 \div 15$ V.

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


$V_{CE} = 920$ V;
 $V_{GE} = \pm 15$ V;
 $L = 56$ nH.
 $T_{vj\ (max)} = 150^\circ\text{C}$.

Chart 17 – typ. rated current vs frequency.



Duty cycle 50%;
 $T_c = 80\text{ }^\circ\text{C}$;
 $T_{vj(max)} = 175\text{ }^\circ\text{C}$.

