

Features

- IGBT4 = 4. generation fast trench IGBT (Infineon)
- CAL4 = Soft switching 4. generation CAL-diode
- Isolated copper baseplate using DBC technology (Direct Bonded Copper)
- Increased power cycling capability
- With integrated gate resistor
- For higher switching frequencies up to 20kHz



Typical Applications

- AC inverter drives
- UPS
- Electronic welders at fsw up to 20 kHz

Remarks

- Case temperature limited to $T_c = 125^\circ\text{C}$ max.
- Recommended $T_{op} = -40 \dots +150^\circ\text{C}$
- Product reliability results valid for $T_j = 150^\circ\text{C}$

Absolute Maximum Ratings

Symbol	Conditions		Values	Unit
IGBT				
V _{CES}	T _j = 25 °C		1200	V
I _C	T _j = 175 °C	T _c = 25 °C	313	A
		T _c = 80 °C	241	A
I _{Cnom}			200	A
I _{CRM}	I _{CRM} = 3xI _{Cnom}		600	A
V _{GES}			-20 ... 20	V
t _{psc}	V _{CC} = 800 V	T _j = 150 °C	10	μs
	V _{GE} ≤ 15 V			
	V _{CES} ≤ 1200 V			
T _j			-40 ... 175	°C
Inverse diode				
I _F	T _j = 175 °C	T _c = 25 °C	229	A
		T _c = 80 °C	172	A
I _{Fnom}			200	A
I _{FRM}	I _{FRM} = 3xI _{Fnom}		600	A
I _{FSM}	t _p = 10 ms, sin 180°, T _j = 25 °C		990	A
T _j			-40 ... 175	°C

Module				
$I_{t(RMS)}$	$T_{terminal} = 80\text{ °C}$		500	A
T_{stg}			-40 ... 125	°C
V_{isol}	AC sinus 50 Hz, t = 1 min		4000	V

Characteristics

Symbol	Conditions		min.	typ.	max.	Unit
IGBT						
$V_{CE(sat)}$	$I_C = 200\text{ A}$	$T_j = 25\text{ }^{\circ}\text{C}$		1.8	2.05	V
	$V_{GE} = 15\text{ V}$ chiplevel	$T_j = 150\text{ }^{\circ}\text{C}$		2.2	2.4	V
V_{CE0}	chiplevel	$T_j = 25\text{ }^{\circ}\text{C}$		0.8	0.9	V
		$T_j = 150\text{ }^{\circ}\text{C}$		0.7	0.8	V
r_{CE}	$V_{GE} = 15\text{ V}$	$T_j = 25\text{ }^{\circ}\text{C}$		5	5.75	mΩ
	chiplevel	$T_j = 150\text{ }^{\circ}\text{C}$		7.5	8	mΩ
$V_{GE(th)}$	$V_{GE} = V_{CE}, I_C = 7.6\text{ mA}$		5	5.8	6.5	V
I_{CES}	$V_{GE} = 0\text{ V}$	$T_j = 25\text{ }^{\circ}\text{C}$			2.7	mA
	$V_{CE} = 1200\text{ V}$	$T_j = 150\text{ }^{\circ}\text{C}$				mA
C_{ies}	$V_{CE} = 25\text{ Vz}$ $V_{GE} = 0\text{ V}$	$f = 1\text{ MHz}$		12.3		nF
C_{oes}		$f = 1\text{ MHz}$		0.81		nF
C_{res}		$f = 1\text{ MHz}$		0.69		nF
Q_G	$V_{GE} = -8\text{ V}...+15\text{ V}$			1130		nC
R_{Gint}	$T_j = 25\text{ }^{\circ}\text{C}$			3.8		Ω
$t_{d(on)}$	$V_{CC} = 600\text{ V}$ $I_C = 200\text{ A}$ $V_{GE} = \pm 15\text{ V}$ $R_{G\text{ on}} = 1\text{ }\Omega$ $R_{G\text{ off}} = 1\text{ }\Omega$ $di/dt_{on} = 5500\text{ A}/\mu\text{s}$ $di/dt_{off} = 2300\text{ A}/\mu\text{s}$	$T_j = 150\text{ }^{\circ}\text{C}$		185		ns
t_r		$T_j = 150\text{ }^{\circ}\text{C}$		40		ns
E_{on}		$T_j = 150\text{ }^{\circ}\text{C}$		21		mJ
$t_{d(off)}$		$T_j = 150\text{ }^{\circ}\text{C}$		425		ns
t_f		$T_j = 150\text{ }^{\circ}\text{C}$		82		ns
E_{off}		$T_j = 150\text{ }^{\circ}\text{C}$		20		mJ
		$T_j = 150\text{ }^{\circ}\text{C}$				
$R_{th(j-c)}$	per IGBT				0.14	K/W

Symbol	Conditions		min.	typ.	max.	Unit
Inverse diode						
$V_F = V_{EC}$	$I_F = 200\text{ A}$	$T_j = 25\text{ }^{\circ}\text{C}$		2.2	2.52	V
	$V_{GE} = 0\text{ V chiplevel}$	$T_j = 150\text{ }^{\circ}\text{C}$		2.15	2.47	V
V_{F0}	chiplevel	$T_j = 25\text{ }^{\circ}\text{C}$		1.3	1.5	V
		$T_j = 150\text{ }^{\circ}\text{C}$		0.9	1.1	V
r_F	chiplevel	$T_j = 25\text{ }^{\circ}\text{C}$		4.5	5.1	mΩ
		$T_j = 150\text{ }^{\circ}\text{C}$		6.3	6.8	mΩ
I_{RRM}	$I_F = 200\text{ A}$	$T_j = 150\text{ }^{\circ}\text{C}$		174		A
Q_{rr}	$di/dt_{off} = 4450\text{ A}/\mu\text{s}$	$T_j = 150\text{ }^{\circ}\text{C}$		33		μC
E_{rr}	$V_{GE} = \pm 15\text{ V}$ $V_{CC} = 600\text{ V}$	$T_j = 150\text{ }^{\circ}\text{C}$		13		mJ
$R_{th(j-c)}$	per diode				0.26	K/W
Module						
L_{CE}				15	20	nH
$R_{CC'+EE'}$	terminal-chip	$T_c = 25\text{ }^{\circ}\text{C}$		0.25		mΩ
		$T_c = 125\text{ }^{\circ}\text{C}$		0.5		mΩ
$R_{th(c-s)}$	per module			0.02	0.038	K/W
M_s	to heat sink M6		3		5	Nm
M_t		to terminals M6	2.5		5	Nm
w						325

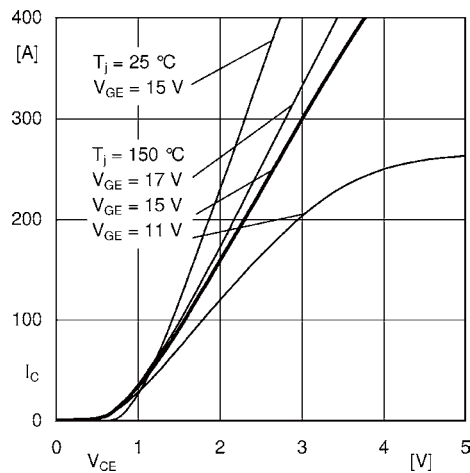


Fig. 1: Typ. output characteristic, inclusive $R_{CC'+EE'}$

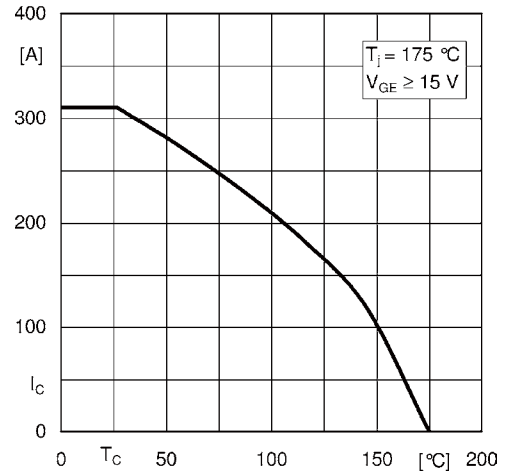


Fig. 2: Rated current vs. temperature $I_C = f(T_C)$

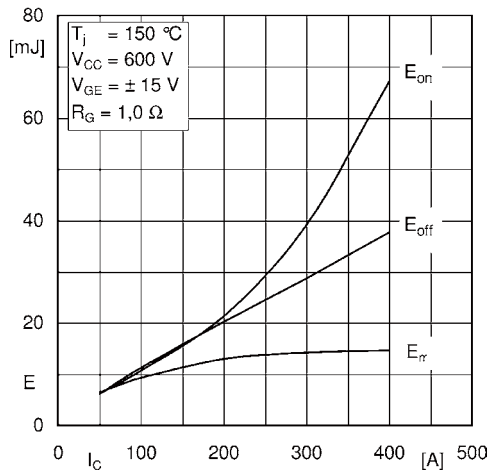


Fig. 3: Typ. turn-on /-off energy = $f(I_C)$

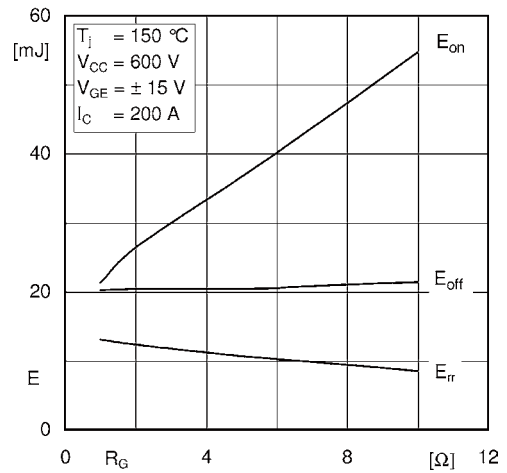


Fig. 4: Typ. turn-on /-off energy = $f(R_G)$

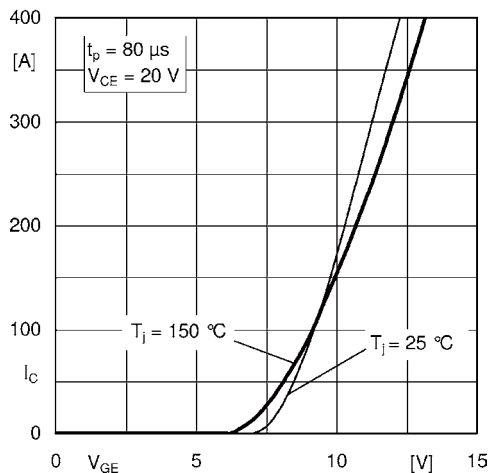


Fig. 5: Typ. transfer characteristic

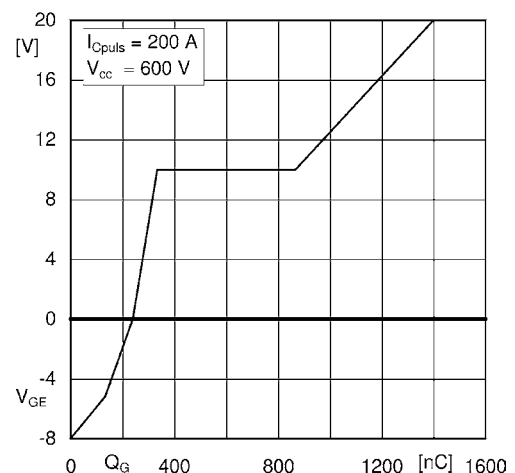


Fig. 6: Typ. gate charge characteristic

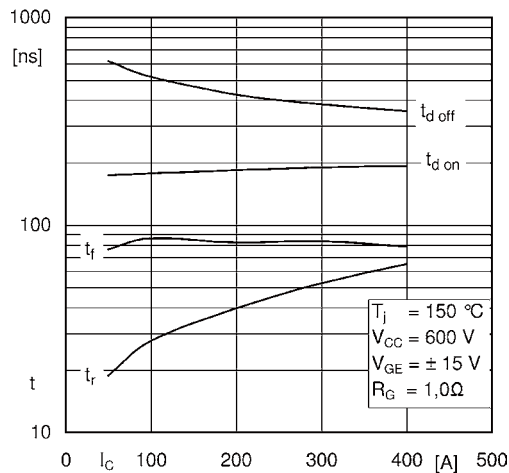


Fig. 7: Typ. switching times vs. I_C

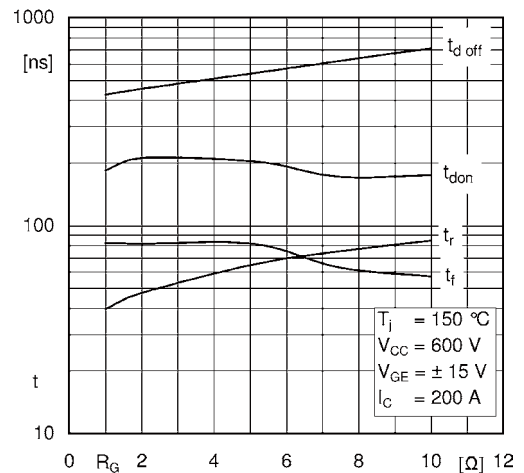


Fig. 8: Typ. switching times vs. gate resistor R_G

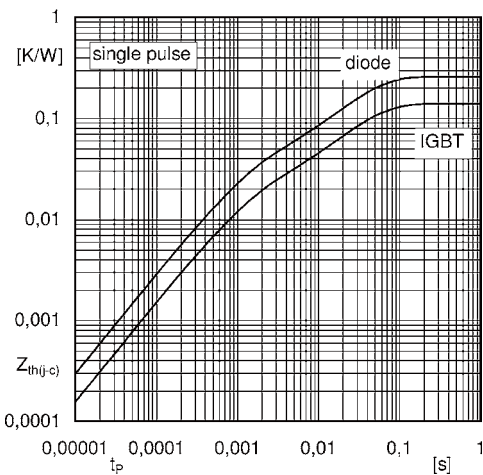


Fig. 9: Transient thermal impedance

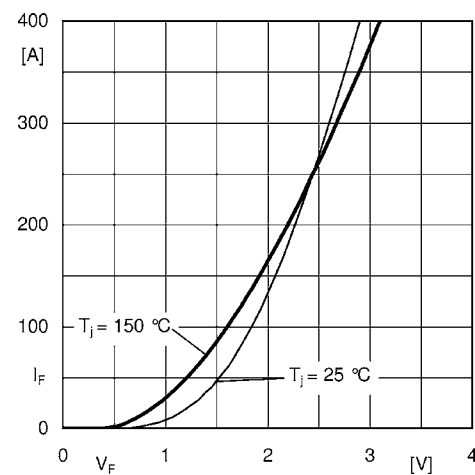


Fig. 10: Typ. CAL diode forward charact., incl. $R_{CC'+EE'}$

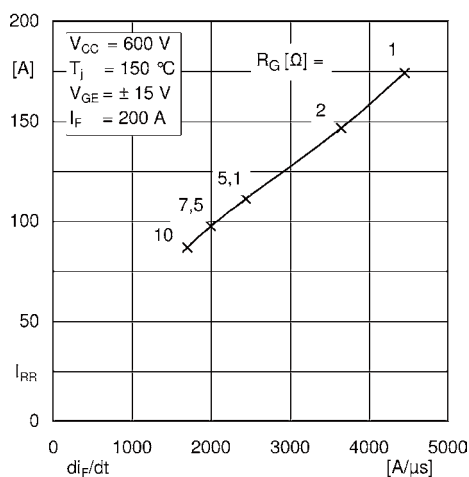


Fig. 11: CAL diode peak reverse recovery current

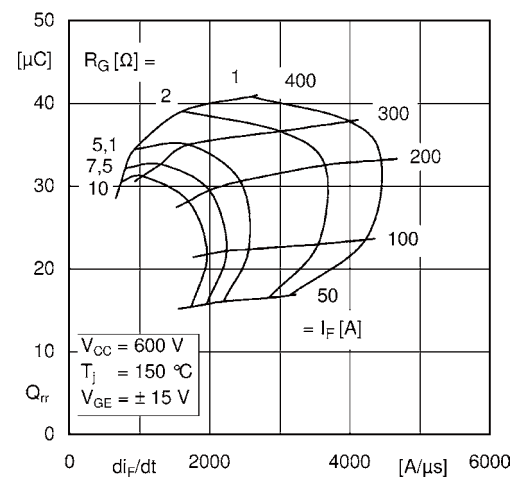
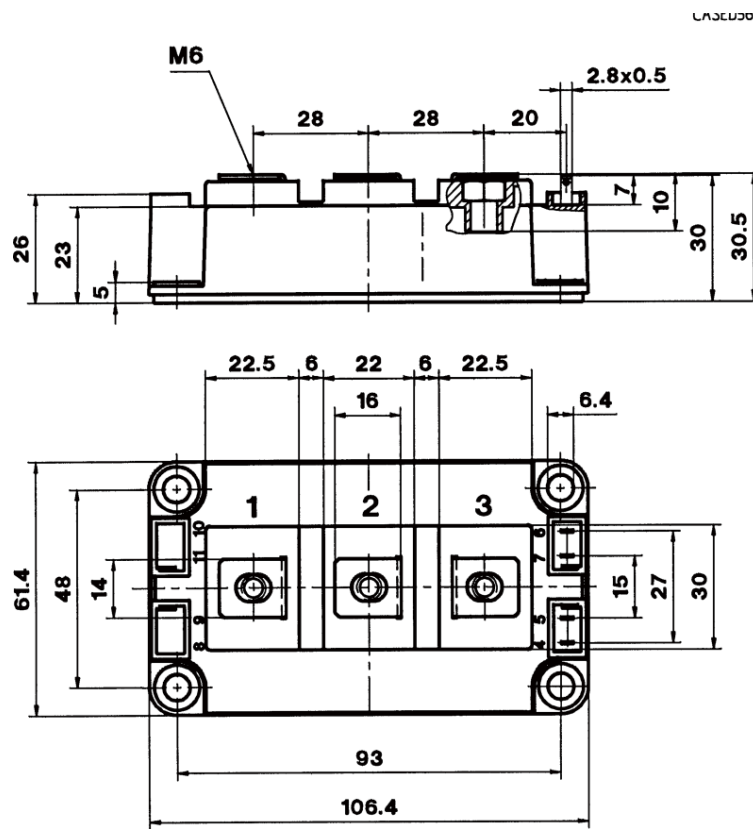
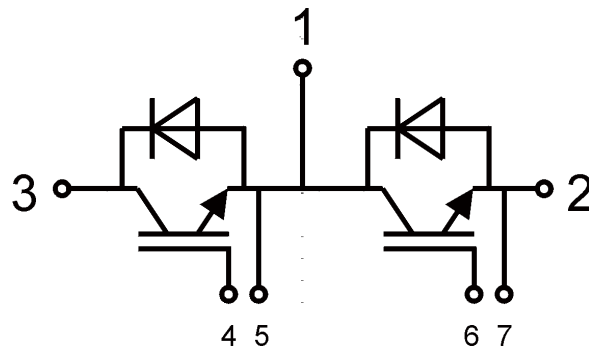


Fig. 12: Typ. CAL diode peak reverse recovery charge



Semitrans 3



GB