

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	422	A
		T _c = 80 °C	324	A
I _{Cnom}			300	A
I _{CRM}	I _{CRM} = 3xI _{Cnom}		900	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	353	A
		T _c = 80 °C	264	A
I _{Fnom}			300	A
I _{FRM}	I _{FRM} = 3xI _{Fnom}		900	A
I _{FSM}	t _p = 10 ms, sin 180°, T _j = 25 °C		1548	A
T _i			-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 = 300 A	T _j = 25 °C		1.85	2.10	V
	V _{GE} = 15 V chiplevel	T _j = 150 °C		2.25	2.45	V
V _{CE0}	chiplevel	T _j = 25 °C		0.8	0.9	V
		T _j = 150 °C		0.7	0.8	V
r _{CE}	V _{GE} = 15 V	T _j = 25 °C		3.5	4.00	mΩ
	chiplevel	T _j = 150 °C		5.17	5.50	mΩ
V _{GE(th)}	V _{GE} =V _{CE} , I _C = 12 mA		5	5.8	6.5	V
I _{CES}	V _{GE} = 0 V	T _j = 25 °C			4.0	mA
	V _{CE} = 1200 V	T _j = 150 °C				mA
C _{ies}	V _{CE} = 25 Vz V _{GE} = 0 V	f = 1 MHz		17.6		nF
C _{oes}		f = 1 MHz		1.16		nF
C _{res}		f = 1 MHz		0.94		nF
Q _G	V _{GE} = - 8 V...+ 15 V			1700		nC
R _{Gint}	T _j = 25 °C			2.5		Ω
t _{d(on)}	V _{CC} = 600 V I _C = 300 A V _{GE} = ±15 V R _{G on} = 1.5 Ω R _{G off} = 1.5 Ω di/dt _{on} = 7500 A/μs di/dt _{off} = 3350 A/μs	T _j = 150 °C		200		ns
t _r		T _j = 150 °C		44		ns
E _{on}		T _j = 150 °C		27		mJ
t _{d(off)}		T _j = 150 °C		450		ns
t _f		T _j = 150 °C		90		ns
E _{off}		T _j = 150 °C		29		mJ
		T _j = 150 °C				
R _{th(j-c)}	per IGBT				0.11	K/W

Symbol	Conditions		min.	typ.	max.	Unit
Inverse diode						
$V_F = V_{EC}$	$I_F = 300\text{ A}$	$T_j = 25\text{ °C}$		2.17	2.49	V
	$V_{GE} = 0\text{ V chiplevel}$	$T_j = 150\text{ °C}$		2.11	2.42	V
V_{FO}	chiplevel	$T_j = 25\text{ °C}$		1.3	1.5	V
		$T_j = 150\text{ °C}$		0.9	1.1	V
r_F	chiplevel	$T_j = 25\text{ °C}$		2.9	3.3	mΩ
		$T_j = 150\text{ °C}$		4.0	4.4	mΩ
I_{RRM}	$I_F = 300\text{ A}$	$T_j = 150\text{ °C}$		345		A
Q_{rr}	$di/dt_{off} = 7300\text{ A/}\mu\text{s}$	$T_j = 150\text{ °C}$		54		μC
E_{rr}	$V_{GE} = \pm 15\text{ V}$ $V_{CC} = 600\text{ V}$	$T_j = 150\text{ °C}$		23		mJ
$R_{th(j-c)}$	per diode				0.17	K/W
Module						
L_{CE}				15	20	nH
$R_{CC'+EE'}$	terminal-chip	$T_c = 25\text{ °C}$		0.25		mΩ
		$T_c = 125\text{ °C}$		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	g

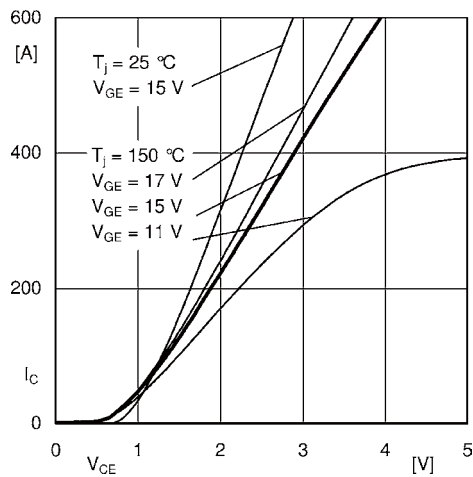


Fig. 1: Typ. output characteristic, inclusive $R_{CC'+EE'}$

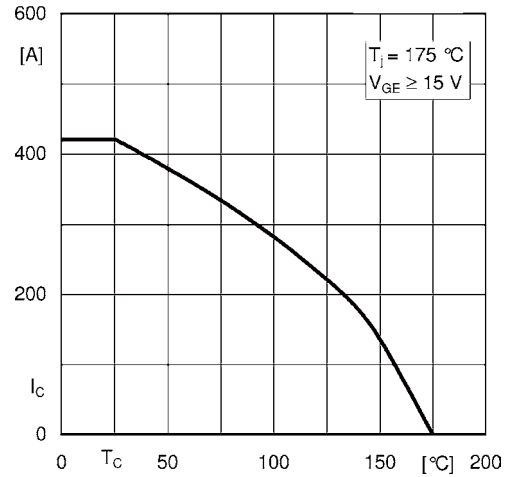


Fig. 2: Rated current vs. temperature $I_C = f(T_C)$

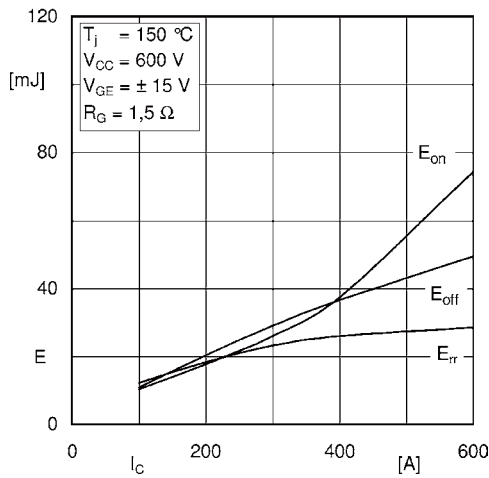


Fig. 3: Typ. turn-on /-off energy = $f(I_C)$

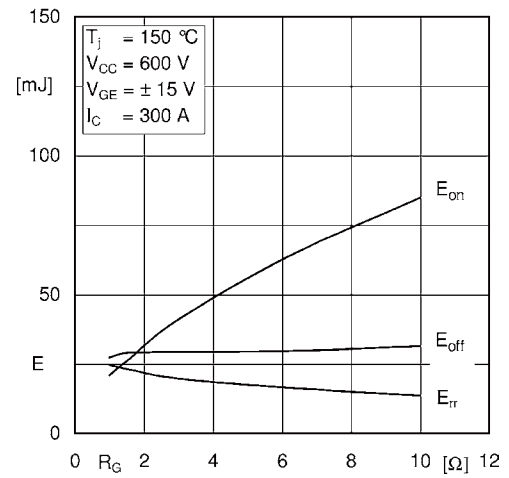


Fig. 4: Typ. turn-on /-off energy = $f(R_G)$

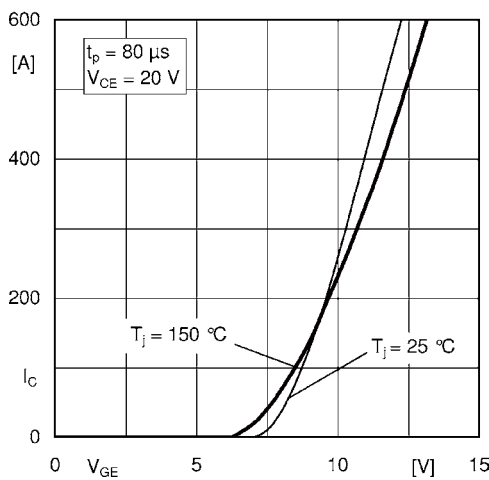


Fig. 5: Typ. transfer characteristic

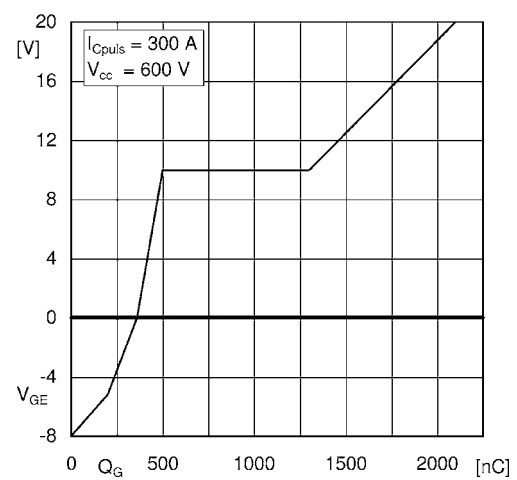


Fig. 6: Typ. gate charge characteristic

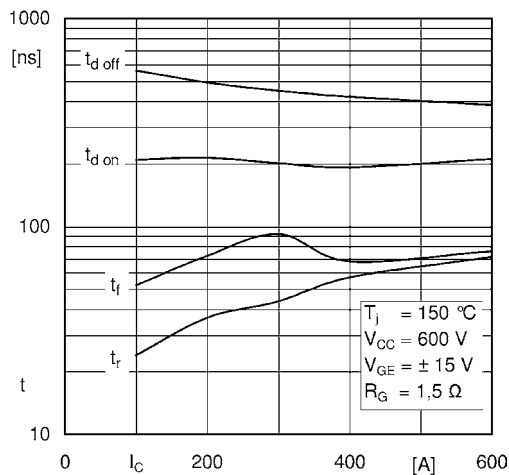


Fig. 7: Typ. switching times vs. I_C

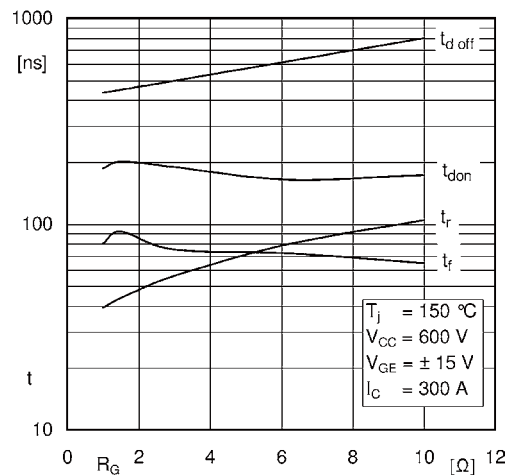


Fig. 8: Typ. switching times vs. gate resistor R_G

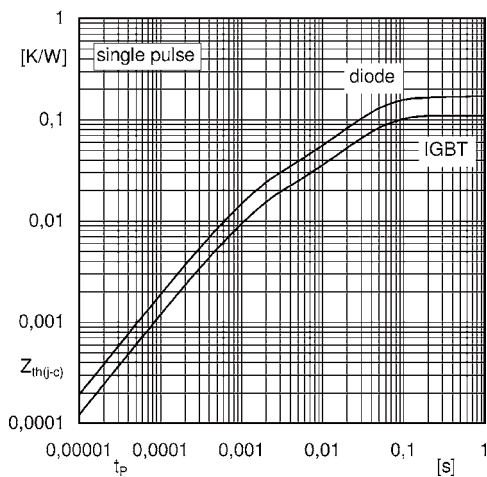


Fig. 9: Transient thermal impedance

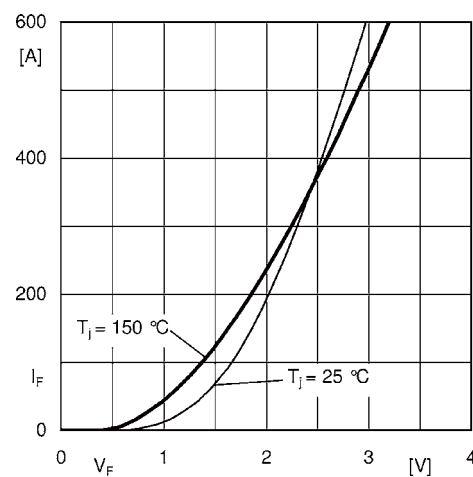


Fig. 10: Typ. CAL diode forward charact., incl. $R_{CC}'+EE'$

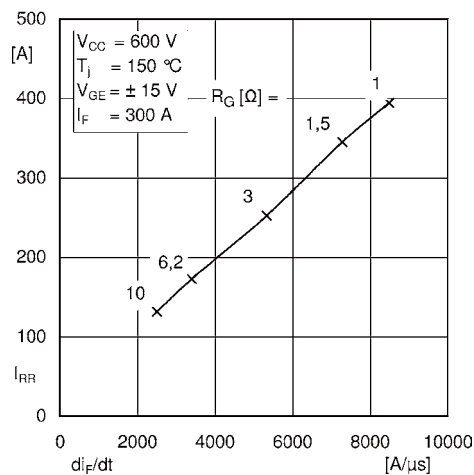


Fig. 11: CAL diode peak reverse recovery current

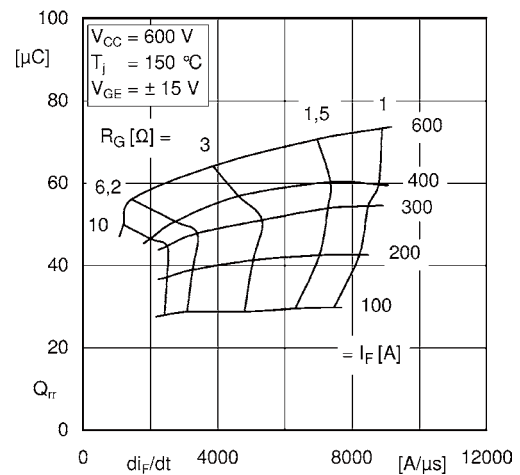
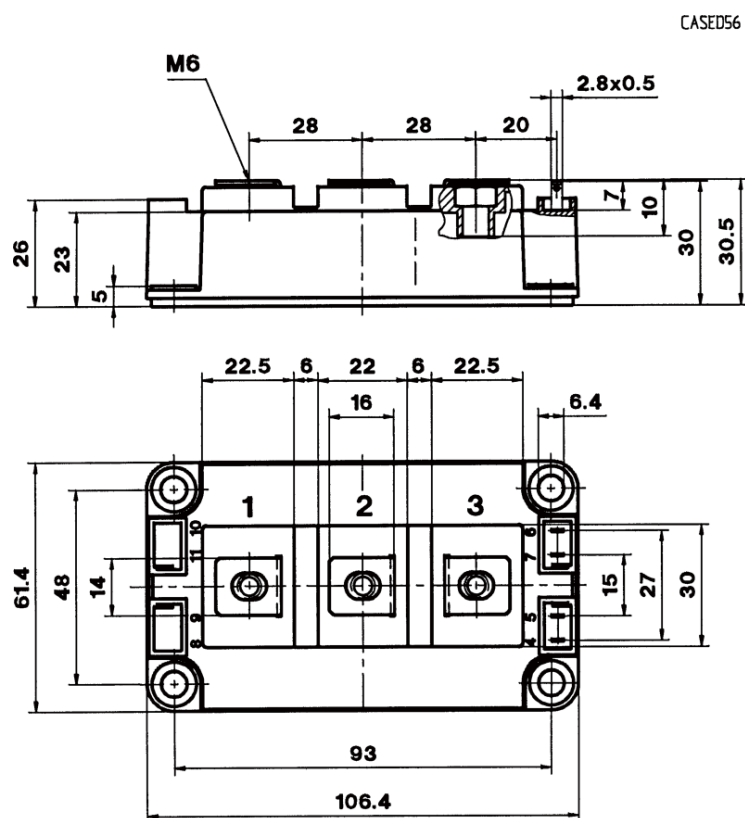
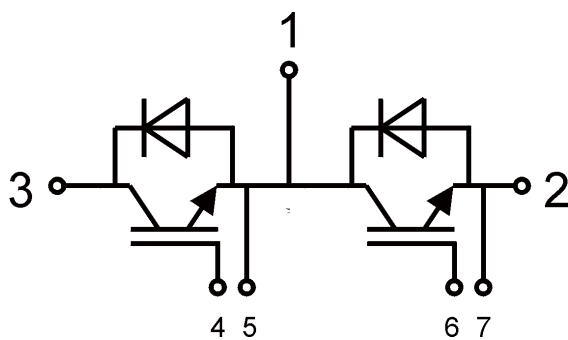


Fig. 12: Typ. CAL diode peak reverse recovery charge



Semitrans 3



GB