

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	616	A
		T _c = 80 °C	474	A
I _{Cnom}			400	A
I _{CRM}	I _{CRM} = 3xI _{Cnom}		1200	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	440	A
		T _c = 80 °C	329	A
I _{Fnom}			400	A
I _{FRM}	I _{FRM} = 3xI _{Fnom}		1200	A
I _{FSM}	t _p = 10 ms, sin 180°, T _j = 25 °C		1980	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					
$V_{CE(sat)}$	$I_C = 400\text{ A}$	$T_j = 25\text{ °C}$	1.8	2.05	V
	$V_{GE} = 15\text{ V}$ chiplevel	$T_j = 150\text{ °C}$	2.20	2.40	V
V_{CE0}	chiplevel	$T_j = 25\text{ °C}$	0.8	0.9	V
		$T_j = 150\text{ °C}$	0.7	0.8	V
r_{CE}	$V_{GE} = 15\text{ V}$	$T_j = 25\text{ °C}$	2.50	2.88	mΩ
	chiplevel	$T_j = 150\text{ °C}$	3.75	4.00	mΩ
$V_{GE(th)}$	$V_{GE} = V_{CE}, I_C = 15.2\text{ mA}$	5	5.8	6.5	V
I_{CES}	$V_{GE} = 0\text{ V}$	$T_j = 25\text{ °C}$		5.0	mA
	$V_{CE} = 1200\text{ V}$	$T_j = 150\text{ °C}$			mA
C_{ies}	$V_{CE} = 25\text{ V}$ $V_{GE} = 0\text{ V}$	$f = 1\text{ MHz}$	24.6		nF
C_{oes}		$f = 1\text{ MHz}$	1.62		nF
C_{res}		$f = 1\text{ MHz}$	1.38		nF
Q_G	$V_{GE} = -8\text{ V}...+15\text{ V}$		2260		nC
R_{Gint}	$T_j = 25\text{ °C}$		1.9		Ω
$t_{d(on)}$	$V_{CC} = 600\text{ V}$	$T_j = 150\text{ °C}$	220		ns
t_r	$I_C = 400\text{ A}$	$T_j = 150\text{ °C}$	47		ns
E_{on}	$V_{GE} = \pm 15\text{ V}$	$T_j = 150\text{ °C}$	33		mJ
$t_{d(off)}$	$R_{Gon} = 1\text{ Ω}$	$T_j = 150\text{ °C}$	505		ns
t_f	$R_{Goff} = 1\text{ Ω}$	$T_j = 150\text{ °C}$	78		ns
E_{off}	$di/dt_{on} = 9700\text{ A/μs}$	$T_j = 150\text{ °C}$	42		mJ
	$di/dt_{off} = 4300\text{ A/μs}$	$T_j = 150\text{ °C}$			
$R_{th(j-c)}$	per IGBT			0.072	K/W

Symbol	Conditions		min.	typ.	max.	Unit
Inverse diode						
$V_F = V_{EC}$	$I_F = 400\text{ A}$	$T_j = 25\text{ °C}$		2.20	2.52	V
	$V_{GE} = 0\text{ V chiplevel}$	$T_j = 150\text{ °C}$		2.15	2.47	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	$T_j = 25\text{ °C}$		2.3	2.5	mΩ
		$T_j = 150\text{ °C}$		3.1	3.4	mΩ
I_{RRM}	$I_F = 400\text{ A}$	$T_j = 150\text{ °C}$		450		A
Q_{rr}	$di/dt_{off} = 8800\text{ A/}\mu\text{s}$	$T_j = 150\text{ °C}$		68		μC
E_{rr}	$V_{GE} = \pm 15\text{ V}$ $V_{CC} = 600\text{ V}$	$T_j = 150\text{ °C}$		30.5		mJ
$R_{th(j-c)}$	per diode				0.14	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

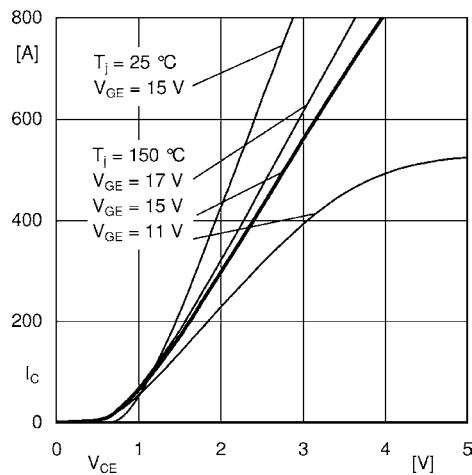


Fig. 1: Typ. output characteristic, inclusive $R_{CC'+EE'}$

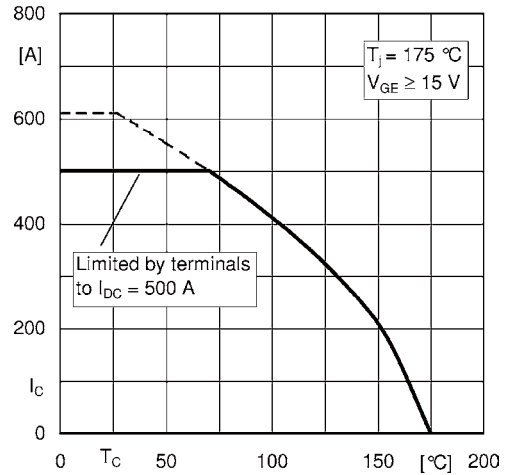


Fig. 2: Rated current vs. temperature $I_C = f(T_C)$

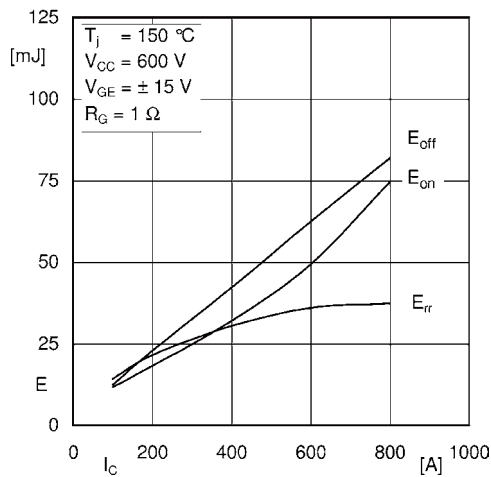


Fig. 3: Typ. turn-on /-off energy = $f(I_C)$

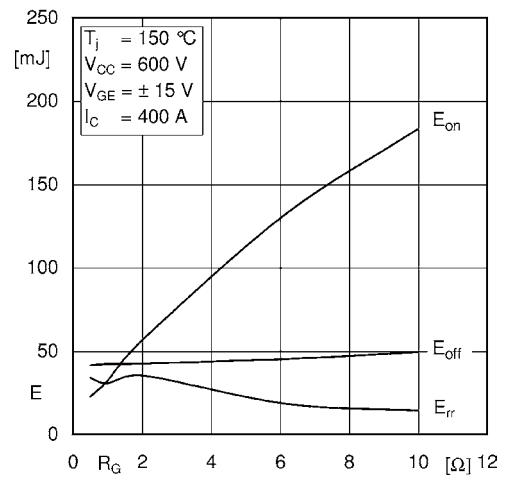


Fig. 4: Typ. turn-on /-off energy = $f(R_G)$

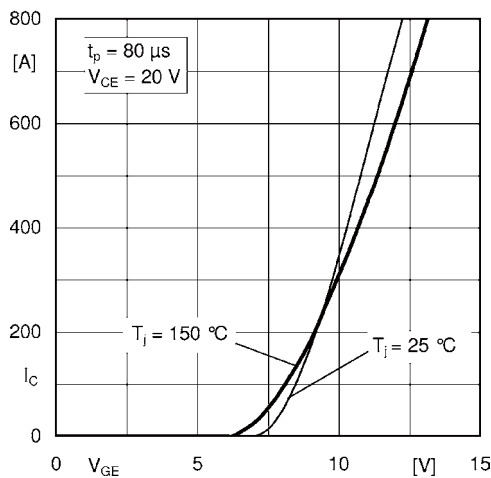


Fig. 5: Typ. transfer characteristic

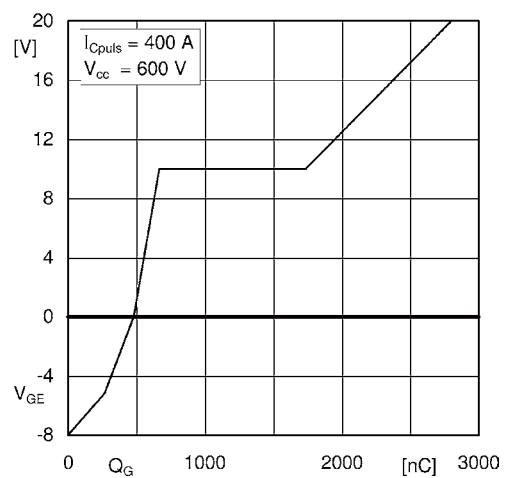
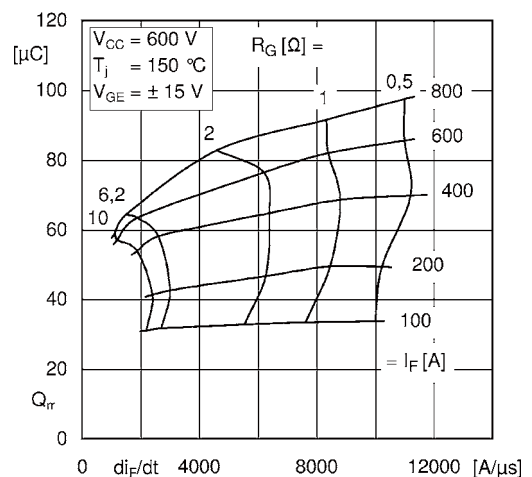
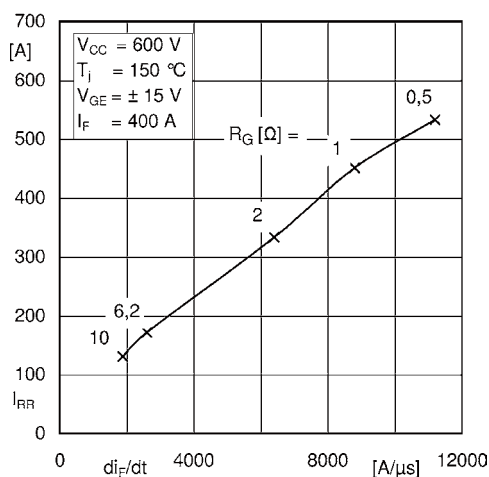
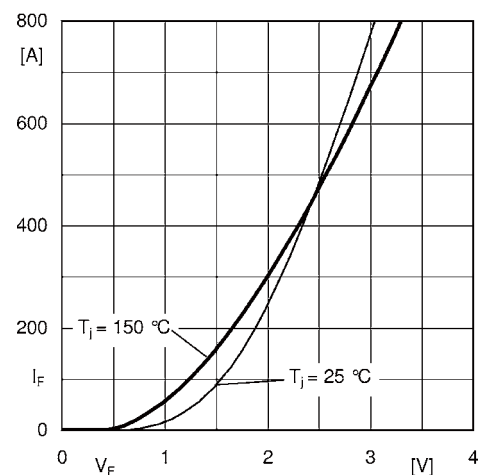
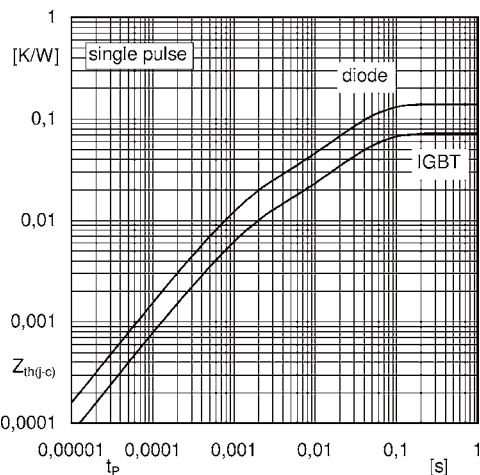
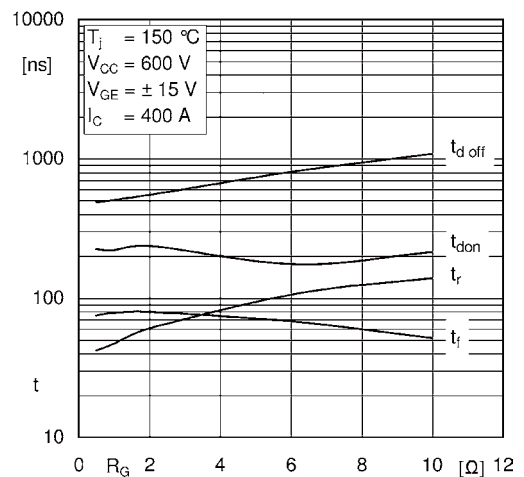
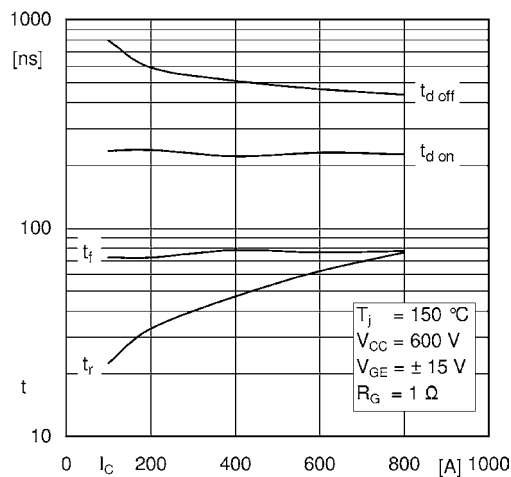
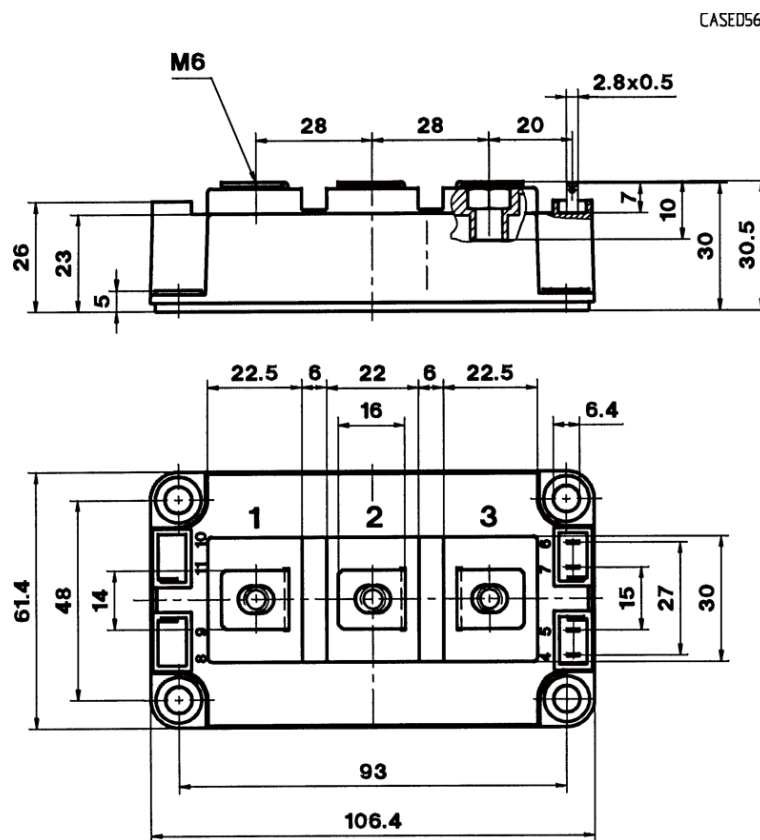
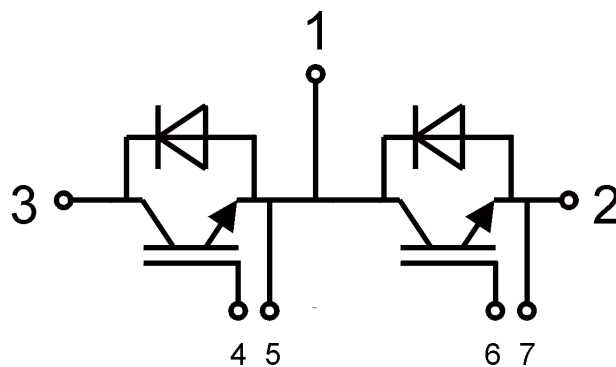


Fig. 6: Typ. gate charge characteristic





Semitrans 3



GB