

Features

- IGBT4 = 4th generation fast trench IGBT (Infineon)
- CAL4 = Soft switching 4th 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	860	A
		T _c = 80 °C	702	A
I _{Cnom}			600	A
I _{CRM}			1800	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				
V _{RRM}	T _j = 25 °C		1200	V
I _F	T _J = 175 °C	T _c = 25 °C	623	A
		T _c = 80 °C	466	A
I _{Fnom}			500	A
I _{FRM}			1200	A
I _{FSM}	t _p = 10 ms, sin 180°, T _j = 25 °C		2736	A
T _i			-40 ... 175	°C

Module				
$I_{t(RMS)}$			500	A
T_{stg}	module without TIM		-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 = 600 A	T _j = 25 °C		1.8	2.05	V
	V _{GE} = 15 V chiplevel	T _j = 150 °C		2.20	2.42	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		1.67	1.92	mΩ
	chiplevel	T _j = 150 °C		2.5	2.7	mΩ
V _{GE(th)}	V _{GE} =V _{CE} , I _C = 24 mA		5	5.8	6.5	V
I _{CES}	V _{GE} = 0 V	T _j = 25 °C			5.0	mA
	V _{CE} = 1200 V					mA
C _{ies}	V _{CE} = 25 Vz V _{GE} = 0 V	f = 1 MHz		37.2		nF
C _{oes}		f = 1 MHz		2.32		nF
C _{res}		f = 1 MHz		2.04		nF
Q _G	V _{GE} = - 8 V...+ 15 V			3400		nC
R _{Gint}	T _j = 25 °C			1.3		Ω
t _{d(on)}	V _{CC} = 600 V I _C = 600 A V _{GE} = ±15 V R _{G on} = 1.6Ω R _{G off} = 1 Ω di/dt _{on} = 8900 A/μs di/dt _{off} = 4300 A/μs dv/dt = 3550 V/μs L _S =24 nH	T _j = 150 °C		178		ns
t _r		T _j = 150 °C		68		ns
E _{on}		T _j = 150 °C		33		mJ
t _{d(off)}		T _j = 150 °C		523		ns
t _f		T _j = 150 °C		116		ns
E _{off}		T _j = 150 °C		70		mJ
		T _j = 150 °C				
R _{th(j-c)}	per IGBT				0.049	K/W
R _{th(c-s)}	per IGBT (λ _{grease} =0.81 W/(m*K))			0.032		K/W
R _{th(c-s)}	per IGBT, pre-applied phase change material			0.016		K/W

Symbol	Conditions		min.	typ.	max.	Unit
Inverse diode						
$V_F = V_{EC}$	$I_F = 600\text{ A}$	$T_j = 25\text{ }^{\circ}\text{C}$		2.28	2.63	V
	$V_{GE} = 0\text{ V chiplevel}$	$T_j = 150\text{ }^{\circ}\text{C}$		2.28	2.61	V
V_{FO}	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	$T_j = 25\text{ }^{\circ}\text{C}$		1.64	1.88	mΩ
		$T_j = 150\text{ }^{\circ}\text{C}$		2.3	2.5	mΩ
I_{RRM}	$I_F = 600\text{ A}$ $di/dt_{off} = 8700\text{ A}/\mu\text{s}$	$T_j = 150\text{ }^{\circ}\text{C}$		566		A
Q_{rr}		$T_j = 150\text{ }^{\circ}\text{C}$		99		μC
E_{rr}		$T_j = 150\text{ }^{\circ}\text{C}$		40		mJ
$R_{th(j-c)}$	per diode				0.095	K/W
$R_{th(c-s)}$	per diode ($\lambda_{grease} = 0.81\text{ W}/(\text{m}\cdot\text{K})$)			0.039		K/W
$R_{th(c-s)}$	per diode, pre-applied phase change material			0.028		K/W
Module						
L_{CE}				15		nH
$R_{CC'+EE'}$	measured per switch	$T_c = 25\text{ }^{\circ}\text{C}$		0.55		mΩ
		$T_c = 125\text{ }^{\circ}\text{C}$		0.85		mΩ
$R_{th(c-s)1}$	calculated without thermal coupling			0.00879		K/W
$R_{th(c-s)2}$	including thermal coupling, Ts underneath module($\lambda_{grease} = 0.81\text{ W}/(\text{m}\cdot\text{K})$)			0.014		K/W
$R_{th(c-s)2}$	including thermal coupling, Ts underneath module, pre-applied phase change material			0.008		K/W
M_s	to heat sink M6		3		5	Nm
M_t		to terminals M6	2.5		5	Nm
w					325	g

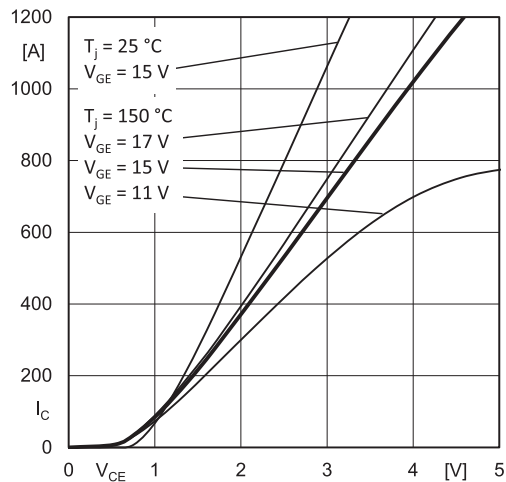


Fig. 1: Typ. output characteristic, inclusive $R_{CC'} + EE'$

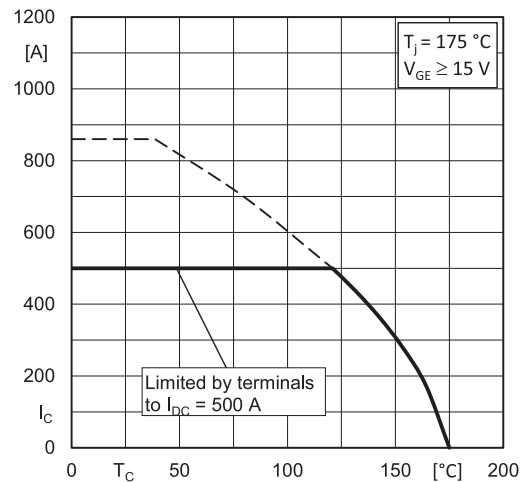


Fig. 2: Rated current vs. temperature $I_C = f(T_C)$

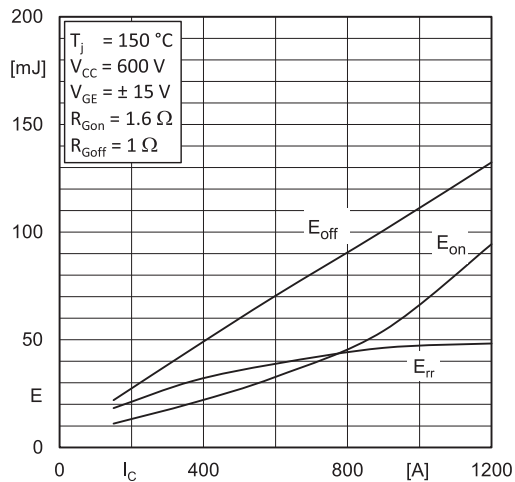


Fig. 3: Typ. turn-on /-off energy = $f(I_C)$

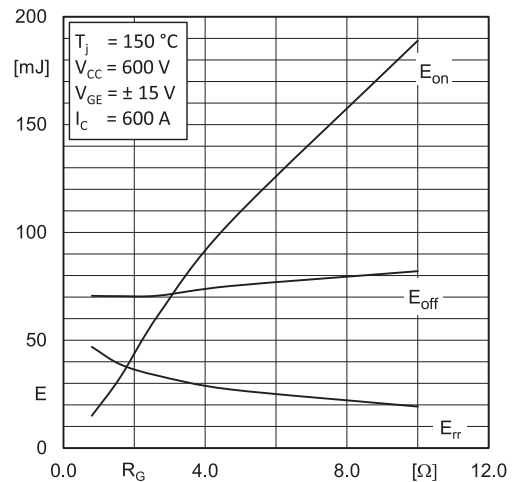


Fig. 4: Typ. turn-on /-off energy = $f(R_G)$

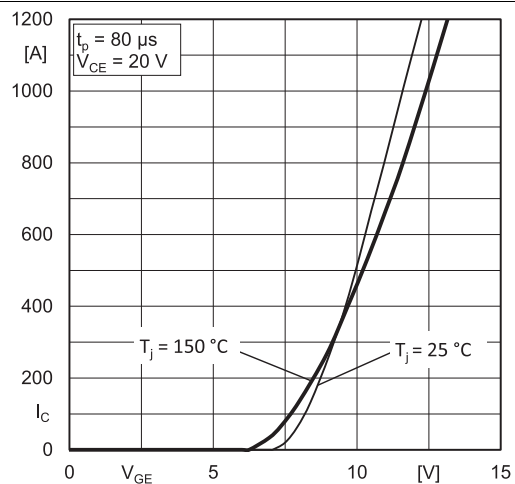


Fig. 5: Typ. transfer characteristic

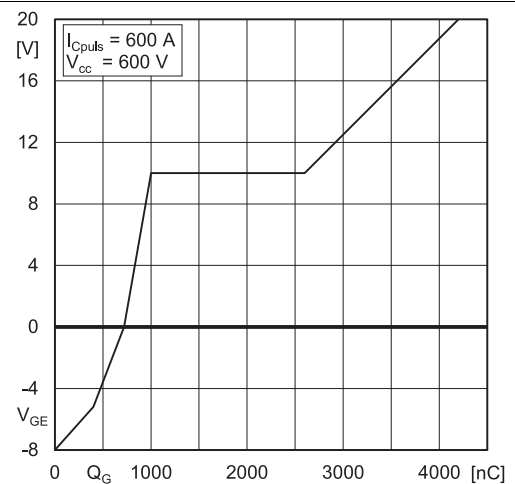
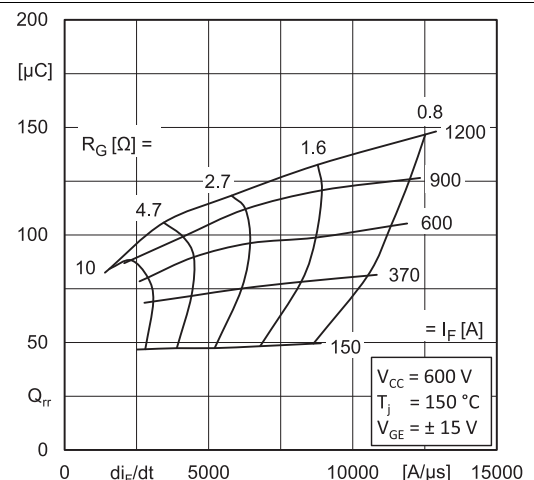
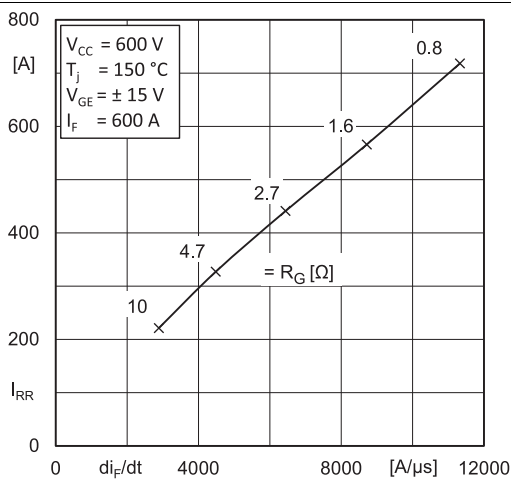
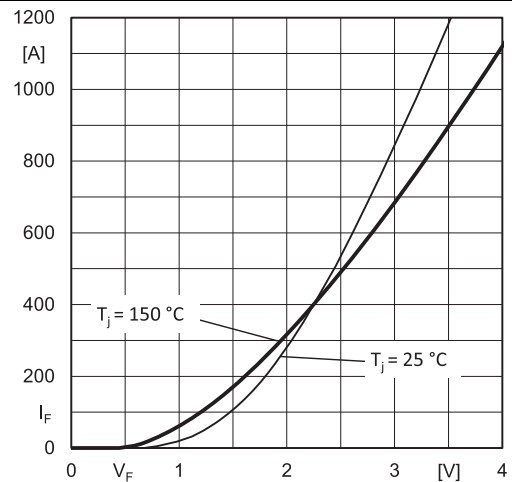
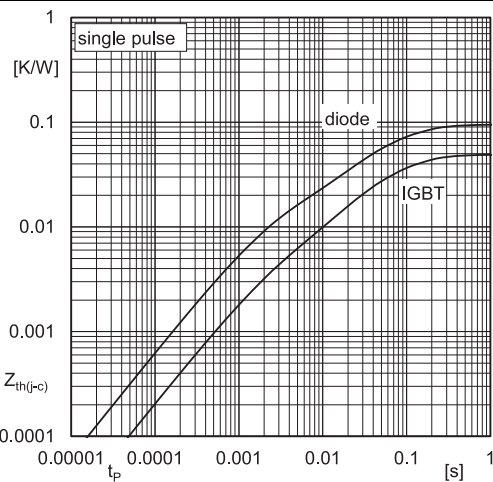
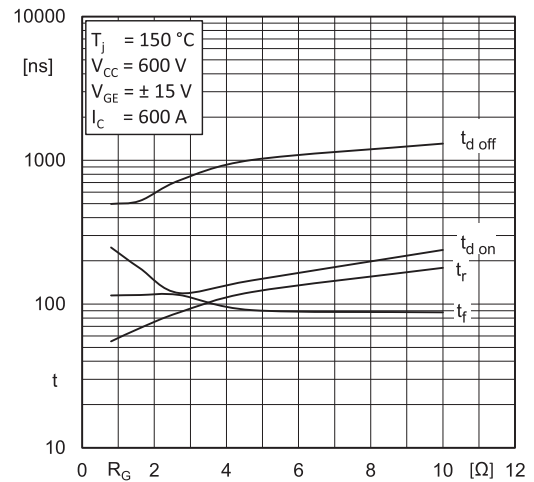
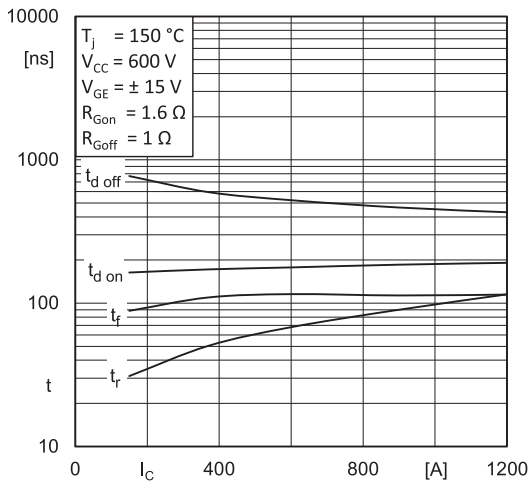
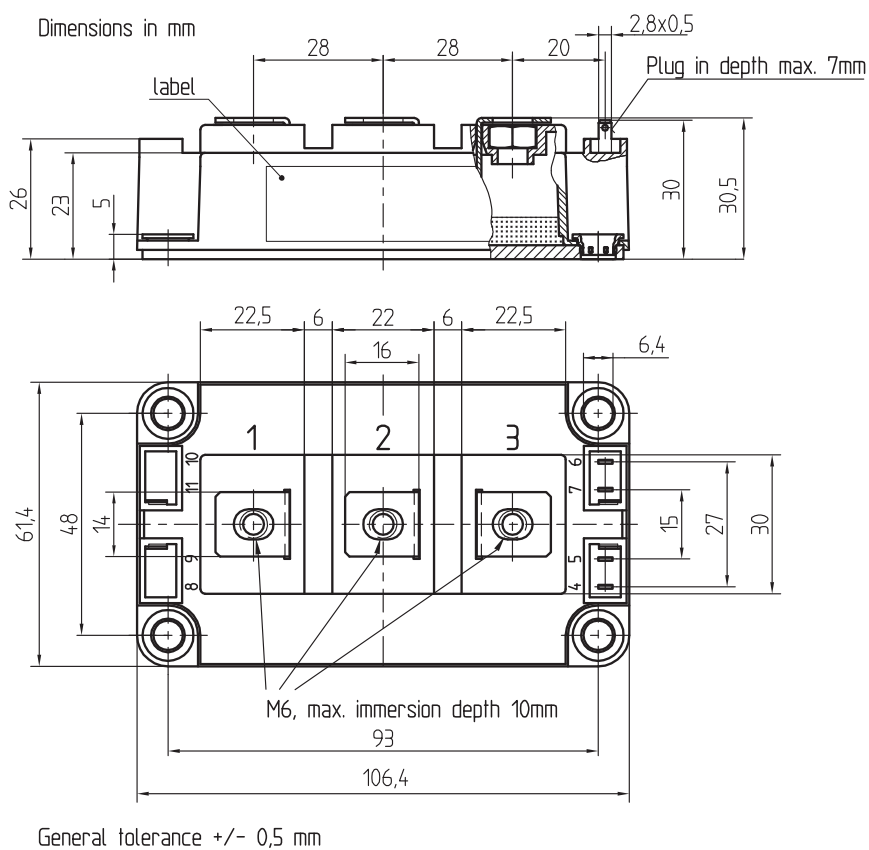
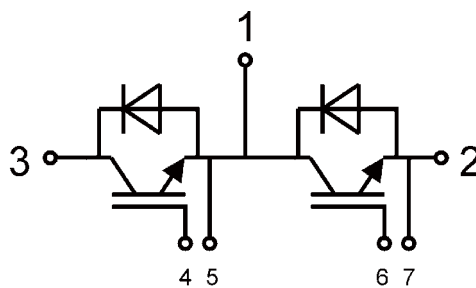


Fig. 6: Typ. gate charge characteristic





Semitrans 3



GB