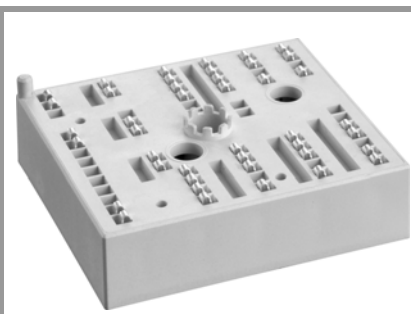


SKiiP 24ACC12T4V10



MiniSKiiP® 2

Twin 6-pack

SKiiP 24ACC12T4V10

Features*

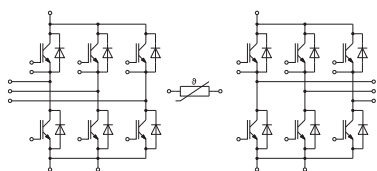
- Trench 4 IGBTs
- Robust and soft switching freewheeling diodes in CAL technology
- Highly reliable spring contacts for electrical connections
- UL recognized: File no. E63532

Typical Applications

- 4Q inverters

Remarks

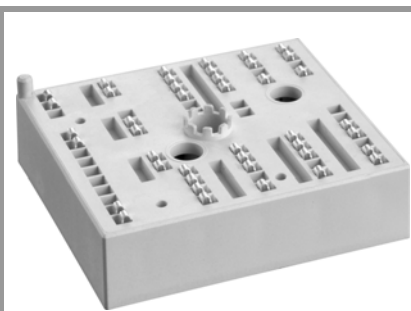
- Max. case temperature limited to $T_C=125^\circ\text{C}$
- Product reliability results valid for $T_j \leq 150^\circ\text{C}$ (recommended $T_{j,op} = -40 \dots +150^\circ\text{C}$)
- Terminal distances sufficient for basic insulation in 3-phase 480VAC TN systems
- DC-link voltage $V_{DC} \leq 800\text{V}$
- Temperature sensor: no basic insulation to main circuit, signal processing with reference to -DC potential
- Please refer to MiniSKiiP "Technical Explanations" and "Mounting Instructions" for further information



ACC

Absolute Maximum Ratings				
Symbol	Conditions		Values	Unit
IGBT 1 - 6				
V _{CES}	T _j = 25 °C		1200	V
I _C	λ _{paste} =0.8 W/(mK)	T _s = 25 °C	41	A
	T _j = 175 °C	T _s = 70 °C	34	A
I _C	λ _{paste} =2.5 W/(mK)	T _s = 25 °C	45	A
	T _j = 175 °C	T _s = 70 °C	37	A
I _{Cnom}			25	A
I _{CRM}			75	A
V _{GES}			-20 ... 20	V
t _{psc}	V _{CC} = 800 V V _{GE} ≤ 15 V V _{CES} ≤ 1200 V	T _j = 150 °C	10	μs
T _j			-40 ... 175	°C
IGBT 7 - 12				
V _{CES}	T _j = 25 °C		1200	V
I _C	λ _{paste} =0.8 W/(mK)	T _s = 25 °C	52	A
	T _j = 175 °C	T _s = 70 °C	43	A
I _C	λ _{paste} =2.5 W/(mK)	T _s = 25 °C	58	A
	T _j = 175 °C	T _s = 70 °C	48	A
I _{Cnom}			35	A
I _{CRM}			105	A
V _{GES}			-20 ... 20	V
t _{psc}	V _{CC} = 800 V V _{GE} ≤ 15 V V _{CES} ≤ 1200 V	T _j = 150 °C	10	μs
T _j			-40 ... 175	°C
Diode 1 - 6				
V _{RRM}	T _j = 25 °C		1200	V
I _F	λ _{paste} =0.8 W/(mK)	T _s = 25 °C	32	A
	T _j = 175 °C	T _s = 70 °C	26	A
I _F	λ _{paste} =2.5 W/(mK)	T _s = 25 °C	35	A
	T _j = 175 °C	T _s = 70 °C	28	A
I _{FRM}			50	A
I _{FSM}	10 ms, sin 180°, T _j = 150 °C		100	A
T _j			-40 ... 175	°C
Diode 7 - 12				
V _{RRM}	T _j = 25 °C		1200	V
I _F	λ _{paste} =0.8 W/(mK)	T _s = 25 °C	44	A
	T _j = 175 °C	T _s = 70 °C	35	A
I _F	λ _{paste} =2.5 W/(mK)	T _s = 25 °C	49	A
	T _j = 175 °C	T _s = 70 °C	40	A
I _{FRM}			70	A
I _{FSM}	10 ms, sin 180°, T _j = 150 °C		170	A
T _j			-40 ... 175	°C
Module				
I _{t(RMS)}	20 A per spring		40	A
T _{stg}	module without TIM		-40 ... 125	°C
V _{isol}	AC sinus 50 Hz, 1 min		2500	V

SKiiP 24ACC12T4V10



MiniSKiiP® 2

Twin 6-pack

SKiiP 24ACC12T4V10

Features*

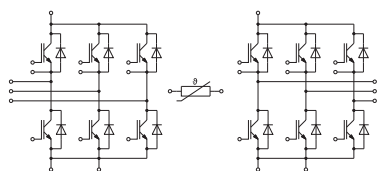
- Trench 4 IGBTs
- Robust and soft switching freewheeling diodes in CAL technology
- Highly reliable spring contacts for electrical connections
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Typical Applications

- 4Q inverters

Remarks

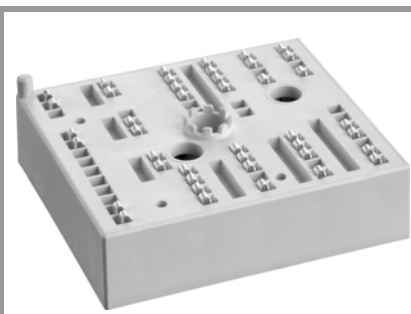
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- Temperature sensor: no basic insulation to main circuit, signal processing with reference to -DC potential
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ACC

Characteristics						
Symbol	Conditions		min.	typ.	max.	Unit
IGBT 1 - 6						
V _{CE(sat)}	I _C = 25 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		0.80	0.90	V
		T _j = 150 °C		0.70	0.80	V
r _{CE}	V _{GE} = 15 V chiplevel	T _j = 25 °C		42	48	mΩ
		T _j = 150 °C		62	66	mΩ
V _{GE(th)}	V _{GE} = V _{CE} V, I _C = 1 mA		5.3	5.8	6.3	V
I _{CES}	V _{GE} = 0 V	T _j = 25 °C			1	mA
	V _{CE} = 1200 V					mA
C _{ies}	V _{CE} = 25 V V _{GE} = 0 V	f = 1 MHz		1.45		nF
C _{oes}		f = 1 MHz		0.12		nF
C _{res}		f = 1 MHz		0.05		nF
Q _G	V _{GE} = - 8 V...+ 15 V			142		nC
R _{Gint}	T _j = 25 °C			0		Ω
t _{d(on)}	V _{CC} = 600 V	T _j = 150 °C		96		ns
t _r	I _C = 25 A	T _j = 150 °C		80		ns
E _{on}	R _{G on} = 39 Ω	T _j = 150 °C		4.2		mJ
t _{d(off)}	R _{G off} = 39 Ω	T _j = 150 °C		400		ns
t _f	di/dt _{on} = 250 A/μs	T _j = 150 °C		51		ns
E _{off}	di/dt _{off} = 400 A/μs dv/dt = 3600 V/μs V _{GE} = +15/-15 V L _s = 22 nH	T _j = 150 °C		2.6		mJ
R _{th(j-s)}	per IGBT, λ _{paste} =0.8 W/(mK)			1		K/W
R _{th(j-s)}	per IGBT, λ _{paste} =2.5 W/(mK)			0.84		K/W
IGBT 7 - 12						
V _{CE(sat)}	I _C = 35 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		0.80	0.90	V
		T _j = 150 °C		0.70	0.80	V
r _{CE}	V _{GE} = 15 V chiplevel	T _j = 25 °C		30	34	mΩ
		T _j = 150 °C		44	47	mΩ
V _{GE(th)}	V _{GE} = V _{CE} V, I _C = 1 mA		5	5.8	6.5	V
I _{CES}	V _{GE} = 0 V	T _j = 25 °C			1	mA
	V _{CE} = 1200 V			-		mA
C _{ies}	V _{CE} = 25 V V _{GE} = 0 V	f = 1 MHz		1.95		nF
C _{oes}		f = 1 MHz		0.16		nF
C _{res}		f = 1 MHz		0.12		nF
Q _G	V _{GE} = - 8 V...+ 15 V			200		nC
R _{Gint}	T _j = 25 °C			0		Ω
t _{d(on)}	V _{CC} = 600 V	T _j = 150 °C		52		ns
t _r	I _C = 35 A	T _j = 150 °C		34		ns
E _{on}	R _{G on} = 16 Ω	T _j = 150 °C		3.9		mJ
t _{d(off)}	R _{G off} = 16 Ω	T _j = 150 °C		337		ns
t _f	di/dt _{on} = 680 A/μs	T _j = 150 °C		53		ns
E _{off}	di/dt _{off} = 560 A/μs dv/dt = 4000 V/μs V _{GE} = +15/-15 V L _s = 22 nH	T _j = 150 °C		3.5		mJ
R _{th(j-s)}	per IGBT, λ _{paste} =0.8 W/(mK)			0.85		K/W
R _{th(j-s)}	per IGBT, λ _{paste} =2.5 W/(mK)			0.7		K/W

SKiiP 24ACC12T4V10



MiniSKiiP® 2

Twin 6-pack

SKiiP 24ACC12T4V10

Features*

- Trench 4 IGBTs
- Robust and soft switching freewheeling diodes in CAL technology
- Highly reliable spring contacts for electrical connections
- UL recognized: File no. E63532

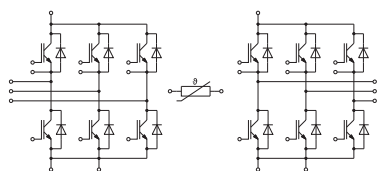
Typical Applications

- 4Q inverters

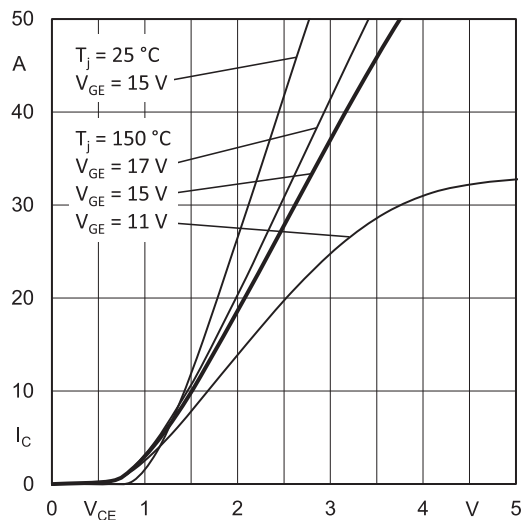
Remarks

- Max. case temperature limited to $T_C=125^\circ\text{C}$
- Product reliability results valid for $T_j \leq 150^\circ\text{C}$ (recommended $T_{j,op} = -40 \dots +150^\circ\text{C}$)
- Terminal distances sufficient for basic insulation in 3-phase 480VAC TN systems
- DC-link voltage $V_{DC} \leq 800\text{V}$
- Temperature sensor: no basic insulation to main circuit, signal processing with reference to –DC potential
- Please refer to MiniSKiiP “Technical Explanations” and “Mounting Instructions” for further information

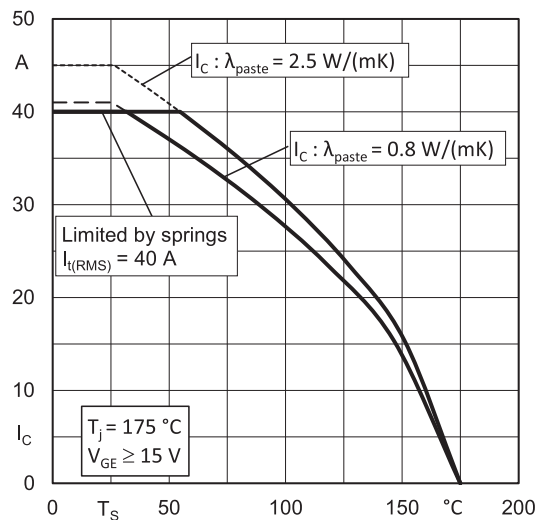
Characteristics					
Symbol	Conditions		min.	typ.	max. Unit
Diode 1 - 6					
$V_F = V_{EC}$	$I_F = 25\text{ A}$ $V_{GE} = 0\text{ V}$ chipelevel	$T_j = 25^\circ\text{C}$		2.41	2.74 V
		$T_j = 150^\circ\text{C}$		2.45	2.79 V
V_{F0}	chipelevel	$T_j = 25^\circ\text{C}$		1.30	1.50 V
		$T_j = 150^\circ\text{C}$		0.90	1.10 V
r_F	chipelevel	$T_j = 25^\circ\text{C}$		44	50 mΩ
		$T_j = 150^\circ\text{C}$		62	68 mΩ
I_{RRM}	$I_F = 25\text{ A}$	$T_j = 150^\circ\text{C}$		17	A
Q_{rr}	$di/dt_{off} = 380\text{ A}/\mu\text{s}$ $V_{GE} = -15\text{ V}$	$T_j = 150^\circ\text{C}$		4	μC
E_{rr}	$V_{CC} = 600\text{ V}$	$T_j = 150^\circ\text{C}$		1.4	mJ
$R_{th(j-s)}$	per Diode, $\lambda_{paste}=0.8\text{ W}/(\text{mK})$			1.52	K/W
$R_{th(j-s)}$	per Diode, $\lambda_{paste}=2.5\text{ W}/(\text{mK})$			1.31	K/W
Diode 7 - 12					
$V_F = V_{EC}$	$I_F = 35\text{ A}$ $V_{GE} = 0\text{ V}$ chipelevel	$T_j = 25^\circ\text{C}$		2.30	2.62 V
		$T_j = 150^\circ\text{C}$		2.29	2.62 V
V_{F0}	chipelevel	$T_j = 25^\circ\text{C}$		1.30	1.50 V
		$T_j = 150^\circ\text{C}$		0.90	1.10 V
r_F	chipelevel	$T_j = 25^\circ\text{C}$		29	32 mΩ
		$T_j = 150^\circ\text{C}$		40	43 mΩ
I_{RRM}	$I_F = 35\text{ A}$	$T_j = 150^\circ\text{C}$		28	A
Q_{rr}	$di/dt_{off} = 720\text{ A}/\mu\text{s}$ $V_{GE} = -15\text{ V}$	$T_j = 150^\circ\text{C}$		5.8	μC
E_{rr}	$V_{CC} = 600\text{ V}$	$T_j = 150^\circ\text{C}$		2.3	mJ
$R_{th(j-s)}$	per Diode, $\lambda_{paste}=0.8\text{ W}/(\text{mK})$			1.2	K/W
$R_{th(j-s)}$	per Diode, $\lambda_{paste}=2.5\text{ W}/(\text{mK})$			1	K/W
Module					
L_{CE}				30	nH
M_s	to heat sink		2	2.5	Nm
w				55	g
Temperature Sensor					
R_{100}	$T_r=100^\circ\text{C}$ ($R_{25}=1000\Omega$)			$1670 \pm 3\%$	Ω
$R_{(T)}$	$R_{(T)}=1000\Omega[1+A(T-25^\circ\text{C})+B(T-25^\circ\text{C})^2]$, $A = 7.635 \cdot 10^{-3} \text{ } ^\circ\text{C}^{-1}$, $B = 1.731 \cdot 10^{-5} \text{ } ^\circ\text{C}^{-2}$				



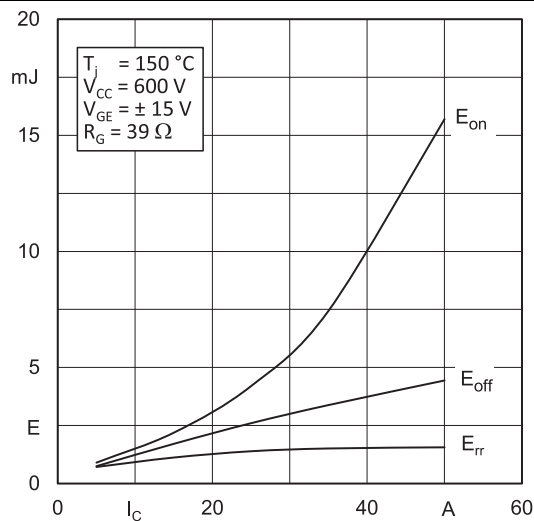
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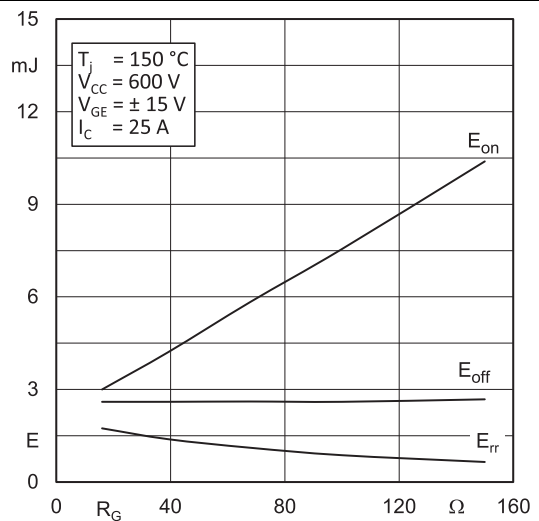
IGBT 1-6 - Fig. 1:
Typ. output characteristic



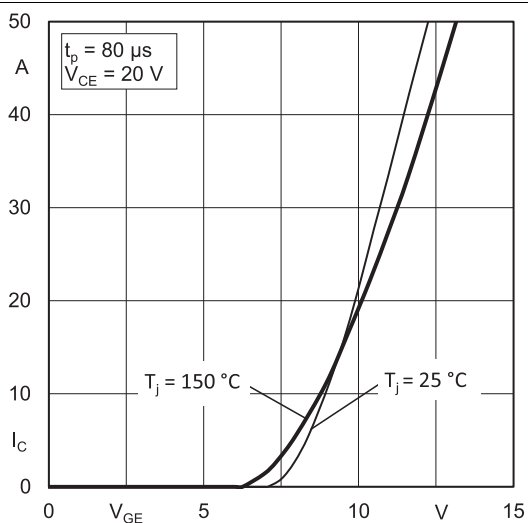
IGBT 1-6 - Fig. 2:
Typ. rated current vs. temperature $I_C = f(T_s)$



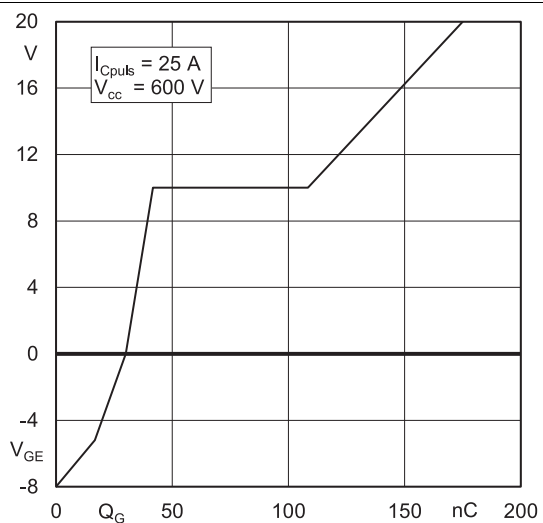
IGBT 1-6 - Fig. 3:
Typ. turn-on /-off energy = $f(I_C)$



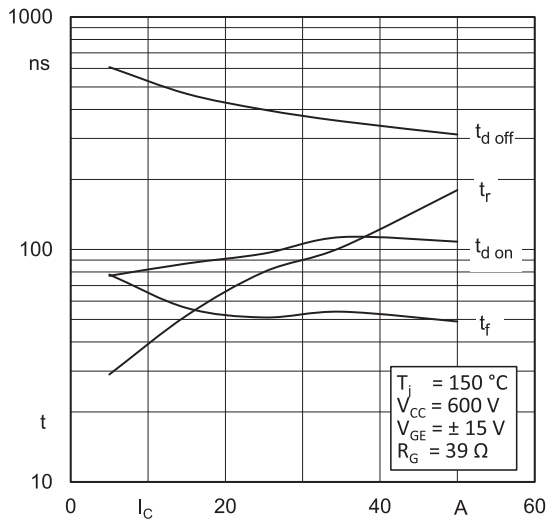
IGBT 1-6 - Fig. 4:
Typ. turn-on /-off energy = $f(R_G)$



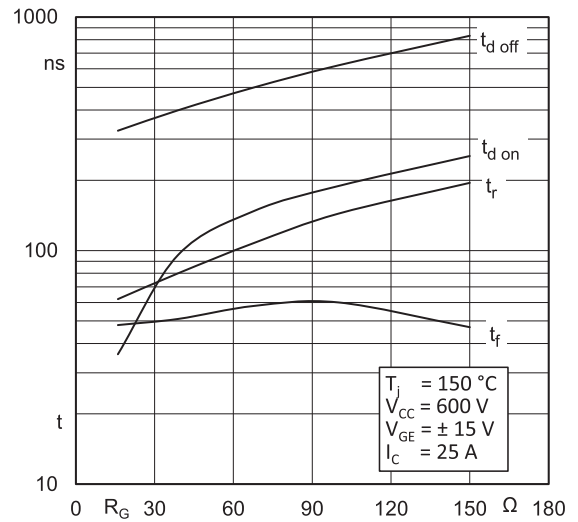
IGBT 1-6 - Fig. 5:
Typ. transfer characteristic



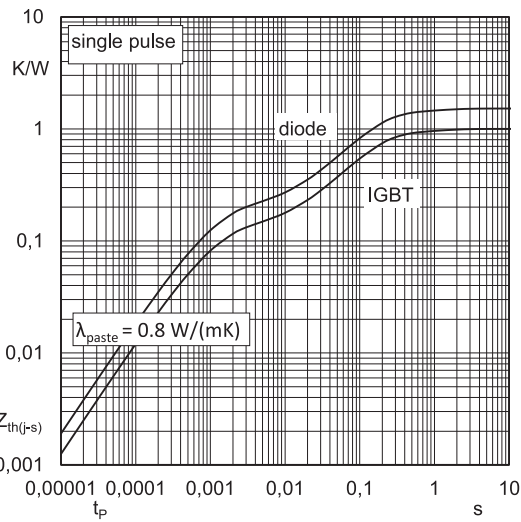
IGBT 1-6 - Fig. 6:
Typ. gate charge characteristic



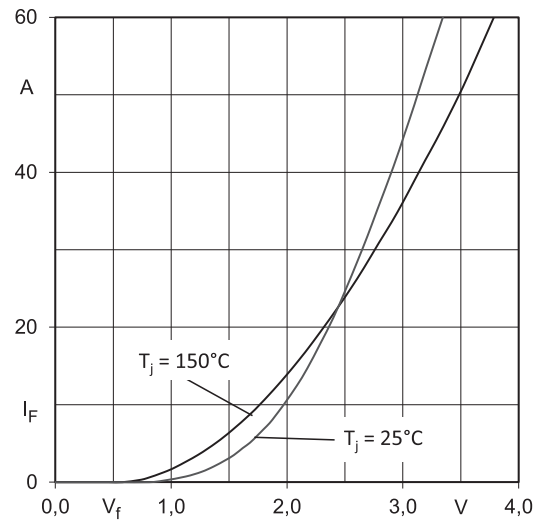
IGBT 1-6 - Fig. 7:
Typ. switching times vs. I_C



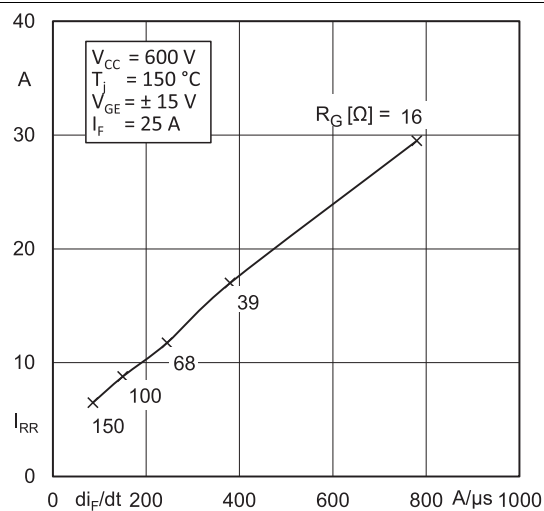
IGBT 1-6 - Fig. 8:
Typ. switching times vs. gate resistor R_G



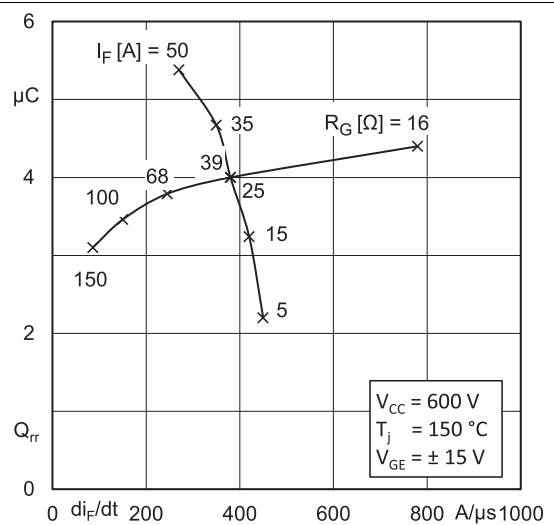
IGBT 1-6 - Fig. 9:
Transient thermal impedance of IGBT and Diode



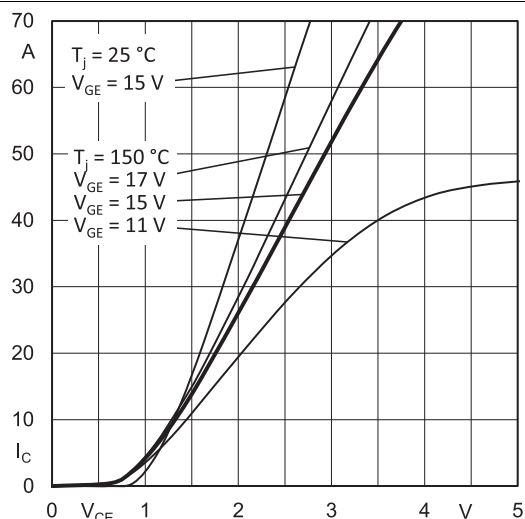
IGBT 1-6 - Fig. 10:
CAL diode forward characteristic



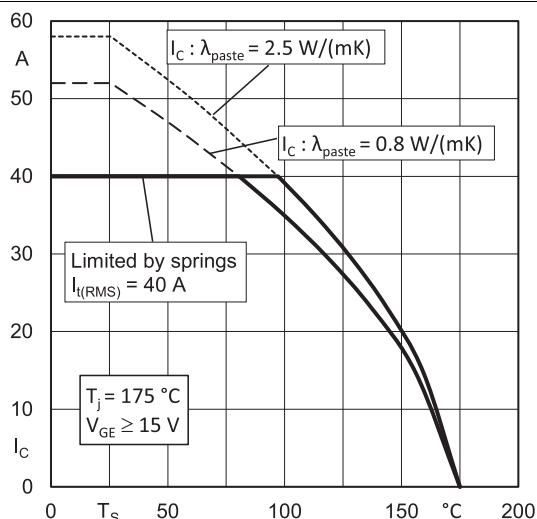
IGBT 1-6 - Fig. 11:
Typ. CAL diode peak reverse recovery current



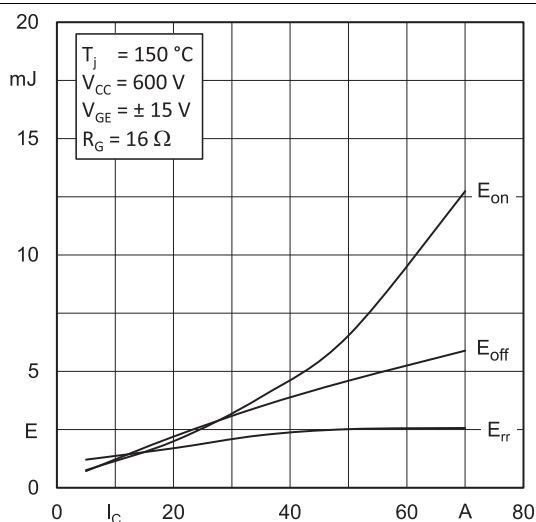
IGBT 1-6 - Fig. 12:
Typ. CAL diode recovery charge



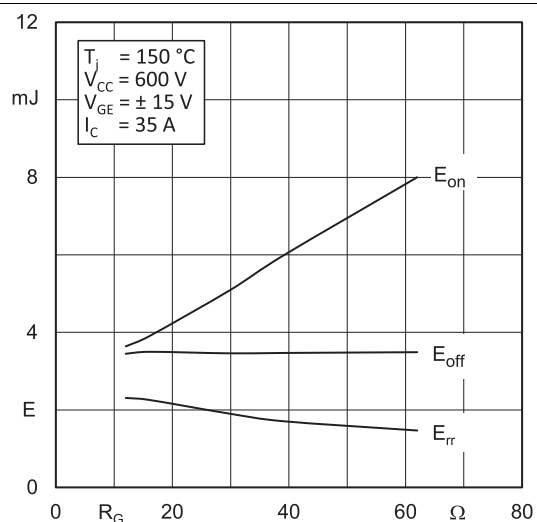
IGBT 7-12 - Fig. 1:
Typ. output characteristic



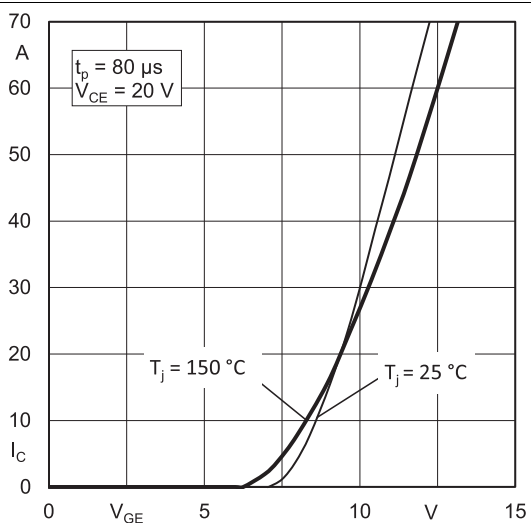
IGBT 7-12 - Fig. 2:
Typ. rated current vs. temperature $I_C = f(T_S)$



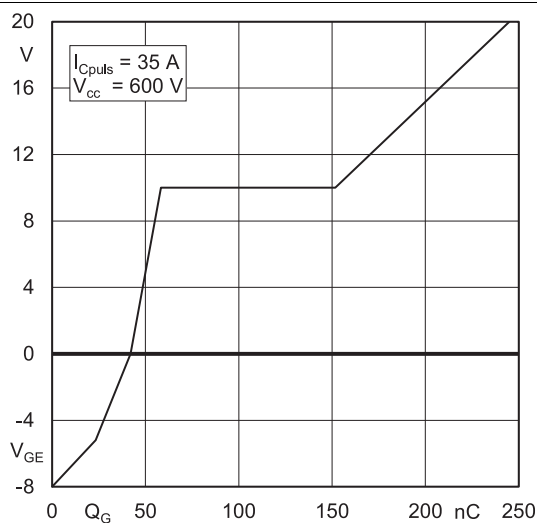
IGBT 7-12 - Fig. 3:
Typ. turn-on /-off energy = $f(I_C)$



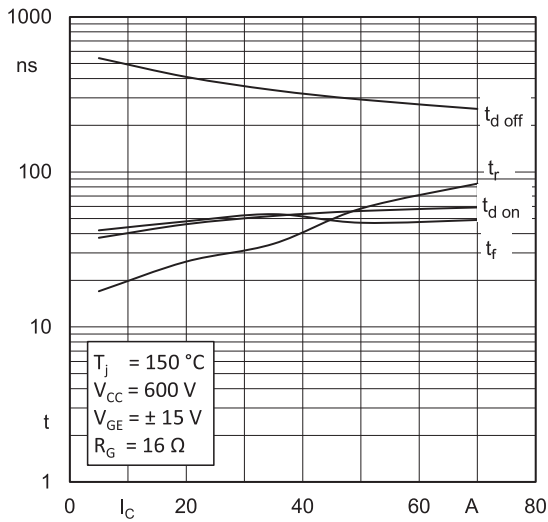
IGBT 7-12 - Fig. 4:
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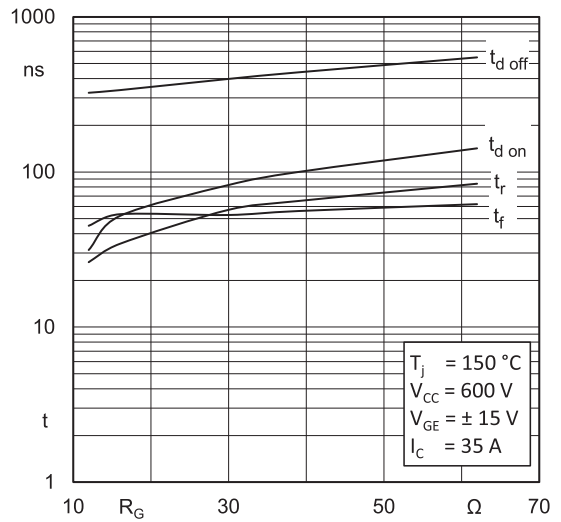
IGBT 7-12 - Fig. 5:
Typ. transfer characteristic



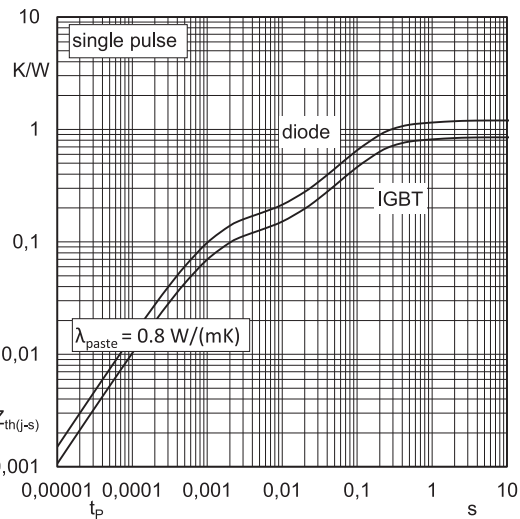
IGBT 7-12 - Fig. 6:
Typ. gate charge characteristic



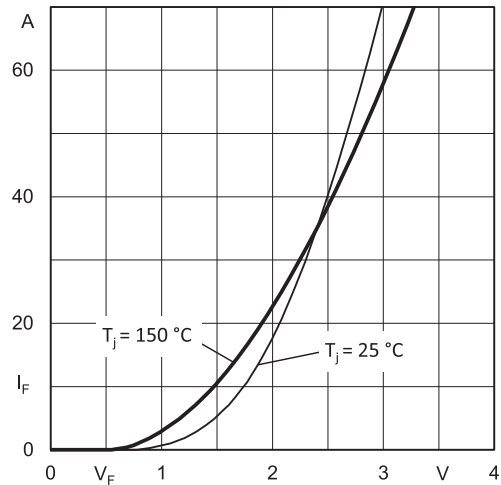
IGBT 7-12 - Fig. 7:
Typ. switching times vs. I_C



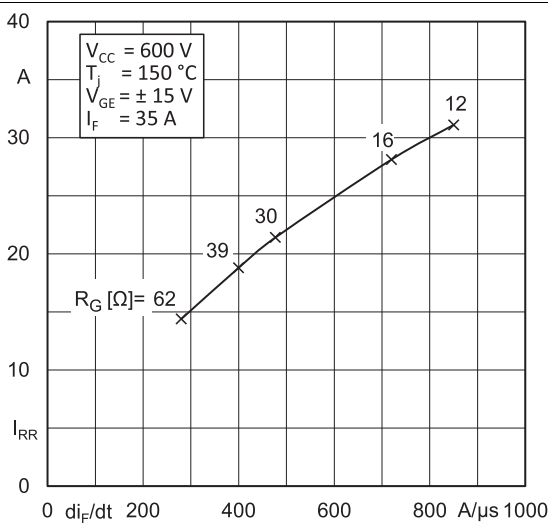
IGBT 7-12 - Fig. 8:
Typ. switching times vs. gate resistor R_G



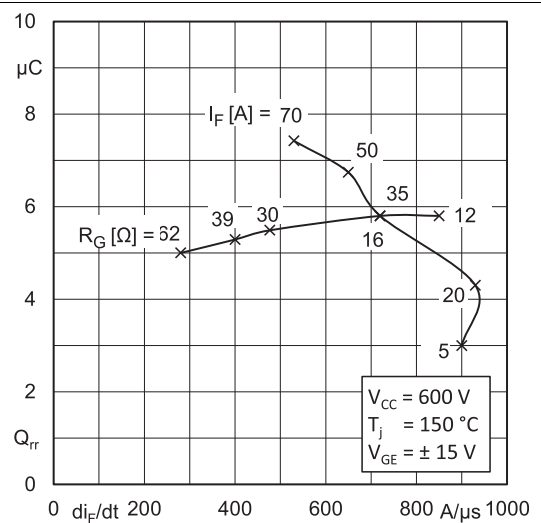
IGBT 7-12 - Fig. 9:
Transient thermal impedance of IGBT and Diode



IGBT 7-12 - Fig. 10:
CAL diode forward characteristic



IGBT 7-12 - Fig. 11:
Typ. CAL diode peak reverse recovery current



IGBT 7-12 - Fig. 12:
Typ. CAL diode recovery charge

This is an electrostatic discharge sensitive device (ESDS) due to international standard IEC 61340.

***IMPORTANT INFORMATION AND WARNINGS**

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