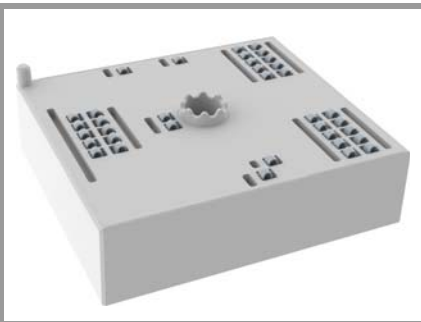


# SKiiP 26GB12F4V1



MiniSKiiP® 2 Dual

## IGBT module

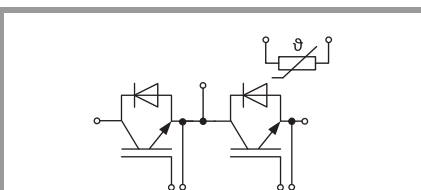
### SKiiP 26GB12F4V1

#### Features

- Fast Trench 4 IGBTs
- Robust and soft freewheeling diodes in CAL technology
- Highly reliable spring contacts for electrical connections
- UL recognised: File no. E63532
- NTC T-Sensor

#### 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  $T_{j,op} = -40 \dots +150^\circ\text{C}$ )



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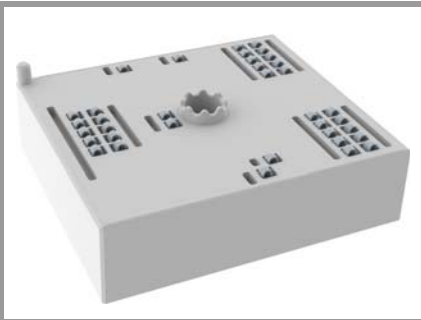
#### Absolute Maximum Ratings

Symbol	Conditions	Values	Unit	
<b>Inverter - IGBT</b>				
$V_{CES}$	$T_j = 25^\circ\text{C}$	1200	V	
$I_C$	$\lambda_{paste} = 0.8 \text{ W/(mK)}$	$T_s = 25^\circ\text{C}$	197	A
	$T_j = 175^\circ\text{C}$	$T_s = 70^\circ\text{C}$	158	A
$I_C$	$\lambda_{paste} = 2.5 \text{ W/(mK)}$	$T_s = 25^\circ\text{C}$	258	A
	$T_j = 175^\circ\text{C}$	$T_s = 70^\circ\text{C}$	208	A
$I_{Cnom}$		200	A	
$I_{CRM}$	$I_{CRM} = 2 \times I_{Cnom}$	400	A	
$V_{GES}$		-20 ... 20	V	
$t_{psc}$	$V_{CC} = 800 \text{ V}$	$T_j = 150^\circ\text{C}$	10	$\mu\text{s}$
	$V_{GE} \leq 15 \text{ V}$			
	$V_{CES} \leq 1200 \text{ V}$			
$T_j$		-40 ... 175	$^\circ\text{C}$	
<b>Inverse - Diode</b>				
$I_F$	$\lambda_{paste} = 0.8 \text{ W/(mK)}$	$T_s = 25^\circ\text{C}$	194	A
	$T_j = 175^\circ\text{C}$	$T_s = 70^\circ\text{C}$	154	A
$I_F$	$\lambda_{paste} = 2.5 \text{ W/(mK)}$	$T_s = 25^\circ\text{C}$	219	A
	$T_j = 175^\circ\text{C}$	$T_s = 70^\circ\text{C}$	174	A
$I_{Fnom}$		200	A	
$I_{FRM}$	$I_{FRM} = 2 \times I_{Fnom}$	400	A	
$I_{FSM}$	10 ms, sin 180°, $T_j = 150^\circ\text{C}$	990	A	
$T_j$		-40 ... 175	$^\circ\text{C}$	
<b>Module</b>				
$I_{t(RMS)}$	$T_{terminal} = 80^\circ\text{C}$ , 20 A per spring	200	A	
$T_{stg}$		-40 ... 125	$^\circ\text{C}$	
$V_{isol}$	AC sinus 50 Hz, t = 1 min	2500	V	

#### Characteristics

Symbol	Conditions	min.	typ.	max.	Unit
<b>Inverter - IGBT</b>					
$V_{CE(sat)}$	$I_C = 200 \text{ A}$ $V_{GE} = 15 \text{ V}$ chiplevel	$T_j = 25^\circ\text{C}$	2.05	2.42	V
		$T_j = 150^\circ\text{C}$	2.59	2.96	V
$V_{CE0}$	chiplevel	$T_j = 25^\circ\text{C}$	1.10	1.28	V
		$T_j = 150^\circ\text{C}$	0.95	1.13	V
$r_{CE}$	$V_{GE} = 15 \text{ V}$ chiplevel	$T_j = 25^\circ\text{C}$	4.8	5.7	m $\Omega$
		$T_j = 150^\circ\text{C}$	8.2	9.2	m $\Omega$
$V_{GE(th)}$	$V_{GE} = V_{CE}$ , $I_C = 7.6 \text{ mA}$	5.2	5.8	6.4	V
$I_{CES}$	$V_{GE} = 0 \text{ V}$ , $V_{CE} = 1200 \text{ V}$ , $T_j = 25^\circ\text{C}$		0.1	0.3	mA
$C_{ies}$	$V_{CE} = 25 \text{ V}$ $V_{GE} = 0 \text{ V}$	$f = 1 \text{ MHz}$	12.30		nF
$C_{oes}$		$f = 1 \text{ MHz}$	0.81		nF
$C_{res}$		$f = 1 \text{ MHz}$	0.69		nF
$Q_G$	$V_{GE} = -8 \text{ V} \dots +15 \text{ V}$		1134		nC
$R_{Gint}$	$T_j = 25^\circ\text{C}$		3.8		$\Omega$
$t_{d(on)}$	$V_{CC} = 600 \text{ V}$	$T_j = 150^\circ\text{C}$	167		ns
$t_r$	$I_C = 200 \text{ A}$ $R_{Gon} = 2 \Omega$	$T_j = 150^\circ\text{C}$	52		ns
		$T_j = 150^\circ\text{C}$	16.8		mJ
$E_{on}$	$R_{Goff} = 2 \Omega$	$T_j = 150^\circ\text{C}$	16.8		mJ
$t_{d(off)}$	$di/dt_{on} = 4100 \text{ A}/\mu\text{s}$	$T_j = 150^\circ\text{C}$	414		ns
$t_f$	$di/dt_{off} = 2500 \text{ A}/\mu\text{s}$	$T_j = 150^\circ\text{C}$	52		ns
$E_{off}$	$V_{GE} = +15/-15 \text{ V}$	$T_j = 150^\circ\text{C}$	16.3		mJ
$R_{th(j-s)}$	per IGBT, $\lambda_{paste} = 0.8 \text{ W/(mK)}$		0.25		K/W
$R_{th(j-s)}$	per IGBT, $\lambda_{paste} = 2.5 \text{ W/(mK)}$		0.16		K/W

# SKiiP 26GB12F4V1



MiniSKiiP® 2 Dual

## IGBT module

### SKiiP 26GB12F4V1

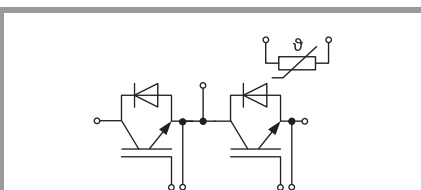
#### Features

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#### 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  $T_{j,op} = -40 \dots +150^\circ\text{C}$ )

Characteristics						
Symbol	Conditions		min.	typ.	max.	Unit
<b>Inverse - Diode</b>						
$V_F = V_{EC}$	$I_F = 200\text{ A}$ $V_{GE} = 0\text{ V}$ chipllevel	$T_j = 25^\circ\text{C}$		2.20	2.52	V
		$T_j = 150^\circ\text{C}$		2.15	2.47	V
$V_{F0}$	chipllevel	$T_j = 25^\circ\text{C}$		1.30	1.50	V
		$T_j = 150^\circ\text{C}$		0.90	1.10	V
$r_F$	chipllevel	$T_j = 25^\circ\text{C}$		4.5	5.1	m $\Omega$
		$T_j = 150^\circ\text{C}$		6.3	6.9	m $\Omega$
$I_{RRM}$	$I_F = 200\text{ A}$	$T_j = 150^\circ\text{C}$		189		A
$Q_{rr}$	$di/dt_{off} = 3840\text{ A}/\mu\text{s}$	$T_j = 150^\circ\text{C}$		28.7		$\mu\text{C}$
$E_{rr}$	$V_{GE} = -15\text{ V}$ $V_{CC} = 600\text{ V}$	$T_j = 150^\circ\text{C}$		11.7		mJ
$R_{th(j-s)}$	per Diode, $\lambda_{paste} = 0.8\text{ W}/(\text{mK})$			0.34		K/W
$R_{th(j-s)}$	per Diode, $\lambda_{paste} = 2.5\text{ W}/(\text{mK})$			0.28		K/W
<b>Module</b>						
$L_{CE}$				20		nH
$M_s$	to heat sink		2		2.5	Nm
$w$				50		g
<b>Temperature Sensor</b>						
$R_{100}$	$T_c = 100^\circ\text{C}$ ( $R_{25} = 5\text{ k}\Omega$ )			$493 \pm 5\%$		$\Omega$
$B_{25/85}$	$R_{(T)} = R_{25} \cdot \exp[B_{25/85} \cdot (1/T - 1/298)]$ , [T]=K			3420		K



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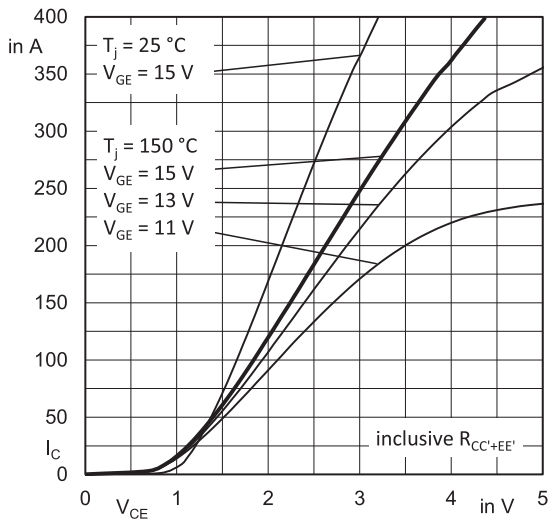


Fig. 1: Typ. output characteristic, inclusive  $R_{CC'+EE'}$

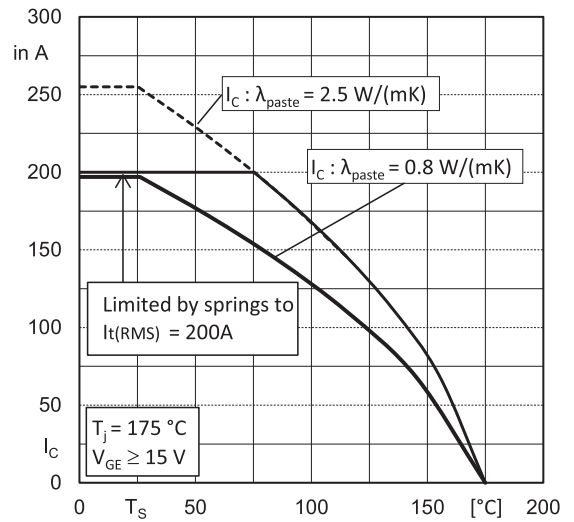


Fig. 2: Rated current vs. temperature  $I_C = f(T_S)$

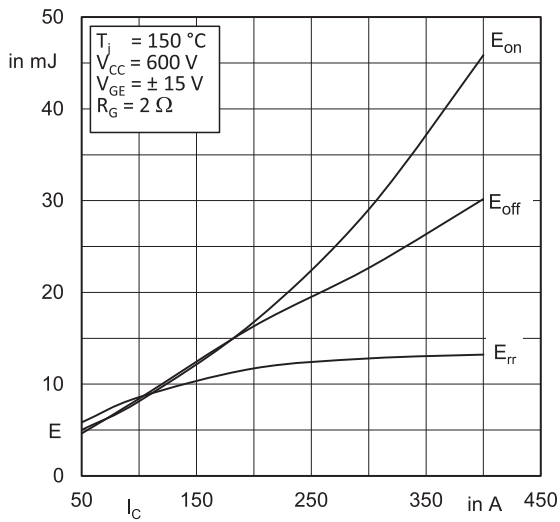


Fig. 3: Typ. turn-on /-off energy =  $f(I_C)$

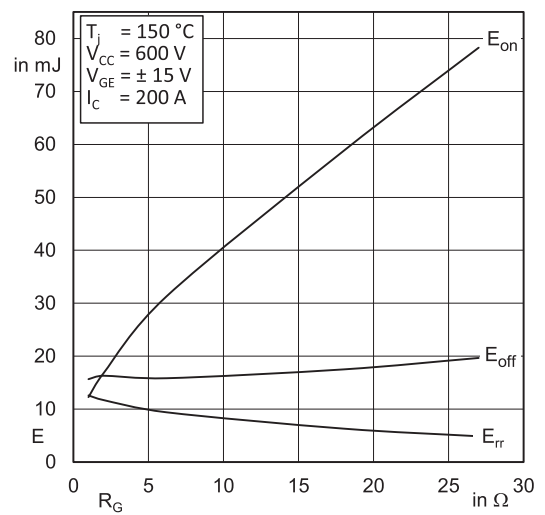


Fig. 4: Typ. turn-on /-off energy =  $f(R_G)$

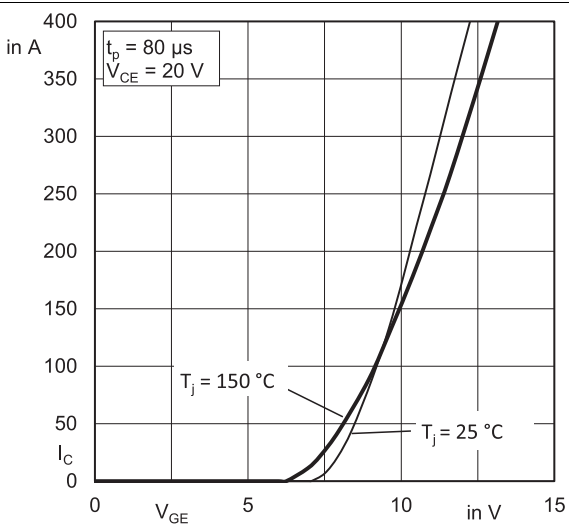


Fig. 5: Typ. transfer characteristic

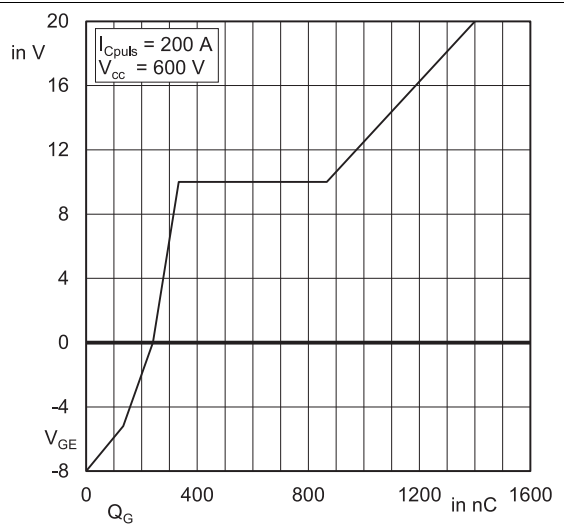


Fig. 6: Typ. gate charge characteristic

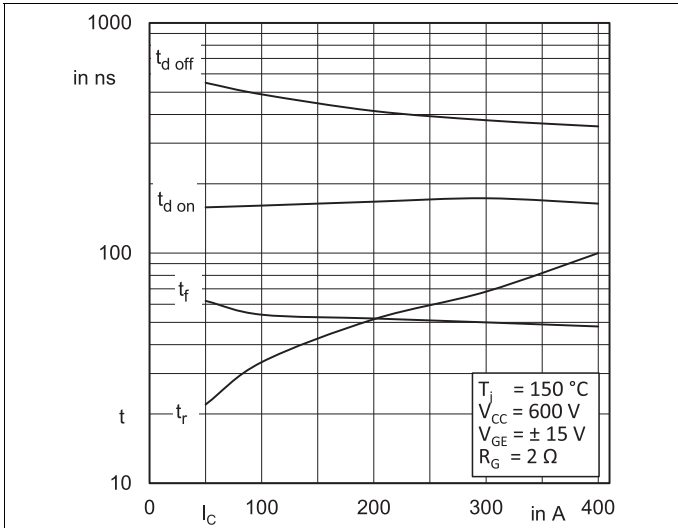


Fig. 7: Typ. switching times vs.  $I_C$

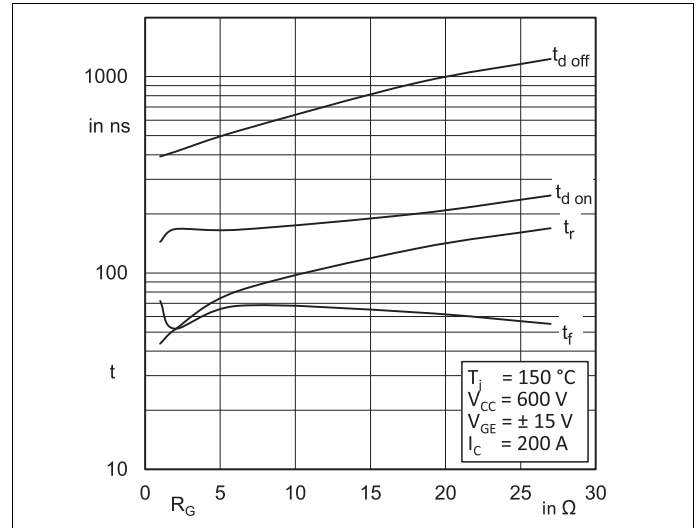


Fig. 8: Typ. switching times vs. gate resistor  $R_G$

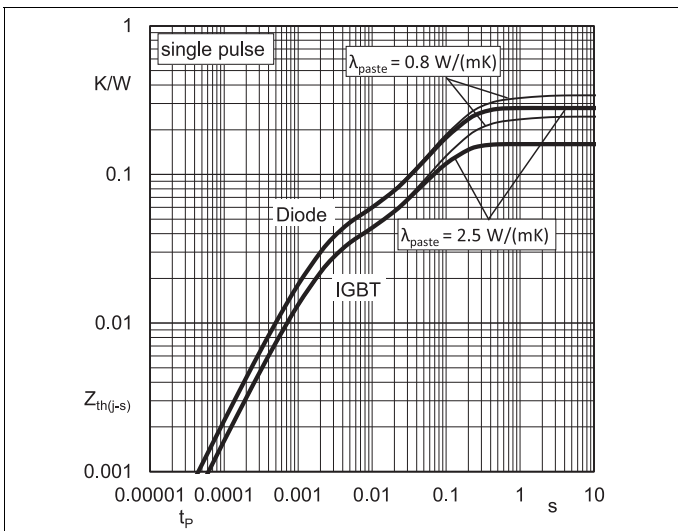


Fig. 9: Transient thermal impedance of IGBT and Diode

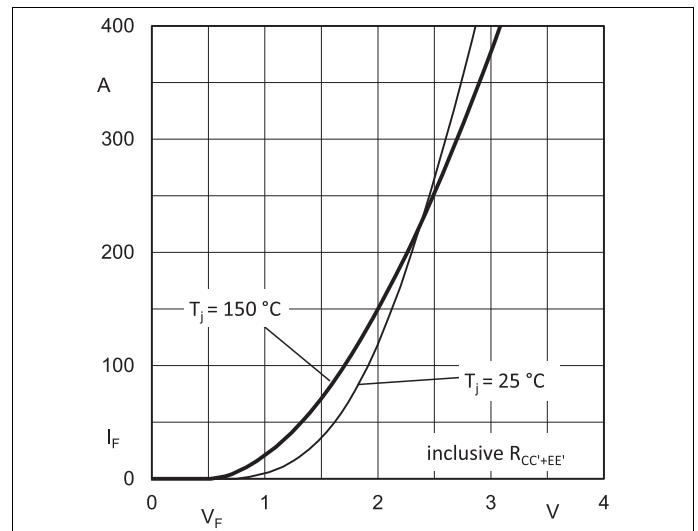


Fig. 10: Typ. CAL diode forward charact., incl.  $R_{CC+EE}$

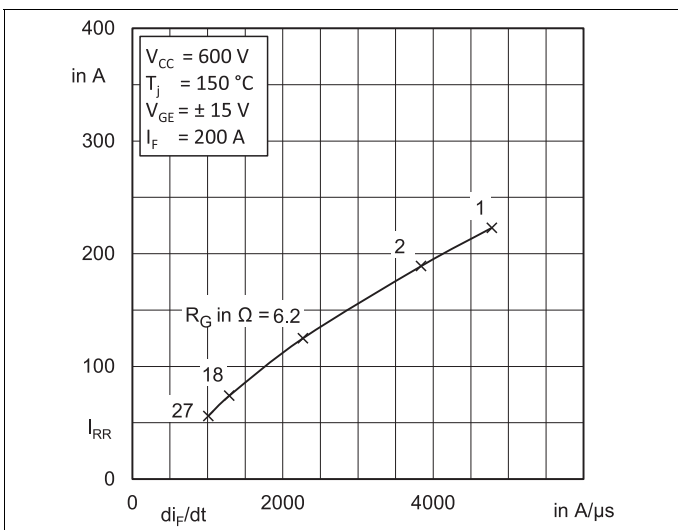


Fig. 11: Typ. CAL diode peak reverse recovery current

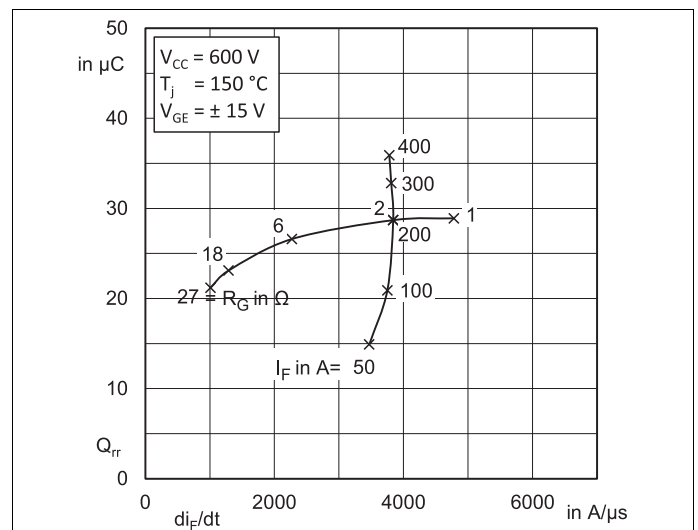


Fig. 12: Typ. CAL diode recovery charge



This is an electrostatic discharge sensitive device (ESDS), international standard IEC 60747-1, chapter IX.

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