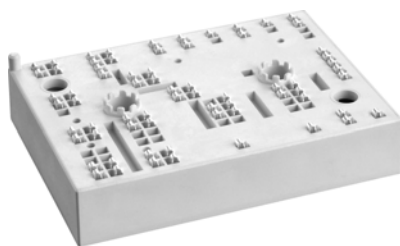


SKiiP 37NAB12T7V1



MiniSKiiP® 3

3-phase Converter-Inverter-Brake (CIB)

SKiiP 37NAB12T7V1

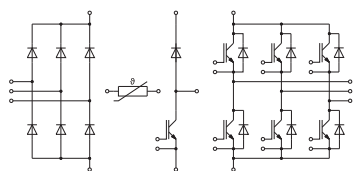
Features*

- 1200V Generation 7 IGBTs (T7)
- Robust and soft switching freewheeling diodes in CAL technology
- New SKR PEP diode technology for enhanced power and environmental robustness
- Highly reliable spring contacts for electrical connections
- UL recognized: File no. E63532

Remarks

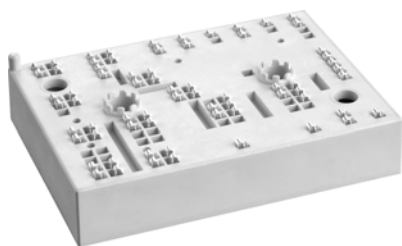
- Max. case temperature limited to $T_C = T_S = 125^\circ\text{C}$
- Product reliability results valid for $T_j \leq 150^\circ\text{C}$; $T_{j,op} > 150^\circ\text{C}$ during overload (Details see AN19-002)
- MiniSKiiP "Technical Explanations" and "Mounting Instructions" are part of the data sheet Please refer to both documents for further information
- For storage and case temperature with TIM see document "Technical Explanations Thermal Interface Materials"
- Inverter IGBT: T1 – T6
- Chopper IGBT: T14
- Inverse Diode: D1 – D6
- Freewheeling Diode: D13
- Rectifier Diode: D7 – D12

Absolute Maximum Ratings				
Symbol	Conditions		Values	Unit
Inverter - IGBT				
V _{CES}	T _j = 25 °C		1200	V
I _C	λ _{paste} =0.8 W/(mK)	T _s = 70 °C	78	A
	T _j = 175 °C	T _s = 100 °C	63	A
I _C	λ _{paste} =2.5 W/(mK)	T _s = 70 °C	91	A
	T _j = 175 °C	T _s = 100 °C	74	A
I _{Cnom}			75	A
I _{CRM}			150	A
V _{GES}			-20 ... 20	V
t _{psc}	V _{CC} = 800 V V _{GE} ≤ 15 V V _{CES} ≤ 1200 V	T _j = 175 °C	7	μs
T _j			-40 ... 175	°C
Chopper - IGBT				
V _{CES}	T _j = 25 °C		1200	V
I _C	λ _{paste} =0.8 W/(mK)	T _s = 70 °C	78	A
	T _j = 175 °C	T _s = 100 °C	63	A
I _C	λ _{paste} =2.5 W/(mK)	T _s = 70 °C	91	A
	T _j = 175 °C	T _s = 100 °C	74	A
I _{Cnom}			75	A
I _{CRM}			150	A
V _{GES}			-20 ... 20	V
t _{psc}	V _{CC} = 800 V V _{GE} ≤ 15 V V _{CES} ≤ 1200 V	T _j = 175 °C	7	μs
T _j			-40 ... 175	°C
Inverse - Diode				
V _{RRM}	T _j = 25 °C		1200	V
I _F	λ _{paste} =0.8 W/(mK)	T _s = 70 °C	65	A
	T _j = 175 °C	T _s = 100 °C	52	A
I _F	λ _{paste} =2.5 W/(mK)	T _s = 70 °C	75	A
	T _j = 175 °C	T _s = 100 °C	60	A
I _{FRM}			150	A
I _{FSM}	t _p = 10 ms, sin 180°, T _j = 150 °C		430	A
T _j			-40 ... 175	°C
Freewheeling - Diode				
V _{RRM}	T _j = 25 °C		1200	V
I _F	λ _{paste} =0.8 W/(mK)	T _s = 70 °C	65	A
	T _j = 175 °C	T _s = 100 °C	52	A
I _F	λ _{paste} =2.5 W/(mK)	T _s = 70 °C	75	A
	T _j = 175 °C	T _s = 100 °C	60	A
I _{FRM}			150	A
I _{FSM}	t _p = 10 ms, sin 180°, T _j = 150 °C		430	A
T _j			-40 ... 175	°C



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MiniSKiiP® 3

3-phase Converter-Inverter-Brake (CIB)

SKiiP 37NAB12T7V1

Features*

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- Highly reliable spring contacts for electrical connections
- UL recognized: File no. E63532

Remarks

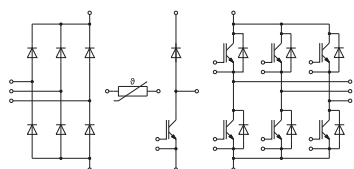
- Max. case temperature limited to $T_C = T_S = 125^\circ\text{C}$
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- Chopper IGBT: T14
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- Freewheeling Diode: D13
- Rectifier Diode: D7 – D12

Absolute Maximum Ratings

Symbol	Conditions		Values	Unit
Rectifier - Diode				
V _{RRM}	T _j = 25 °C		1600	V
I _F	λ _{paste} =0.8 W/(mK)	T _s = 70 °C	84	A
	T _j = 175 °C	T _s = 100 °C	65	A
I _F	λ _{paste} =2.5 W/(mK)	T _s = 70 °C	95	A
	T _j = 175 °C	T _s = 100 °C	74	A
I _{FSM}	t _p = 10 ms	T _j = 25 °C	635	A
	sin 180°	T _j = 150 °C	490	A
i ² t	t _p = 10 ms	T _j = 25 °C	2020	A ² s
	sin 180°	T _j = 150 °C	1200	A ² s
T _j			-40 ... 175	°C
Module				
I _{t(RMS)}	T _{terminal} = 80 °C, 20 A per spring		80	A
T _{stg}	module without TIM		-40 ... 125	°C
V _{isol}	AC sinus 50 Hz, 1 min		2500	V

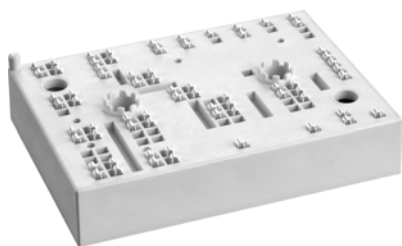
Characteristics

Symbol	Conditions		min.	typ.	max.	Unit
Inverter - IGBT						
V _{CE(sat)}	I _C = 75 A	T _j = 25 °C		1.55	1.70	V
	V _{GE} = 15 V	T _j = 150 °C		1.73	1.88	V
	chiplevel	T _j = 175 °C		1.77	1.92	V
V _{CE0}		T _j = 25 °C		1.00	1.05	V
	chiplevel	T _j = 150 °C		0.80	0.85	V
		T _j = 175 °C		0.75	0.80	V
r _{CE}	V _{GE} = 15 V	T _j = 25 °C		7.3	8.7	mΩ
	chiplevel	T _j = 150 °C		12	14	mΩ
		T _j = 175 °C		14	15	mΩ
V _{GE(th)}	V _{GE} = V _{CE} , I _C = 1.7 mA		5.15	5.8	6.45	V
I _{CES}	V _{GE} = 0 V, V _{CE} = 1200 V, T _j = 25 °C				1	mA
C _{ies}	V _{CE} = 25 V V _{GE} = 0 V	f = 1 MHz		15.10		nF
C _{oes}		f = 1 MHz		0.19		nF
C _{res}		f = 1 MHz		0.54		nF
Q _G	V _{GE} = - 8V ... + 15 V			1050		nC
R _{Gint}	T _j = 25 °C			2.0		Ω
t _{d(on)}	V _{CC} = 600 V	T _j = 25 °C		137		ns
	I _C = 75 A	T _j = 150 °C		142		ns
	R _{G on} = 2.3 Ω	T _j = 175 °C		142		ns
t _r	R _{G off} = 2.3 Ω	T _j = 25 °C		35		ns
	V _{GE} = +15/-15 V	T _j = 150 °C		41		ns
		T _j = 175 °C		44		ns
E _{on}	@ T _j = 150 °C:	T _j = 25 °C		6		mJ
	di/dt _{on} = 1940 A/μs	T _j = 150 °C		8.5		mJ
	dv/dt = 3650 V/μs	T _j = 175 °C		9		mJ



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MiniSKiiP® 3

3-phase Converter-Inverter-Brake (CIB)

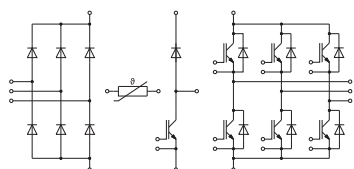
SKiiP 37NAB12T7V1

Features*

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- Robust and soft switching freewheeling diodes in CAL technology
- New SKR PEP diode technology for enhanced power and environmental robustness
- Highly reliable spring contacts for electrical connections
- UL recognized: File no. E63532

Remarks

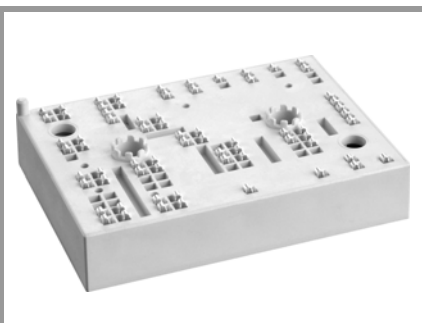
- Max. case temperature limited to $T_C = T_S = 125^\circ\text{C}$
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- Inverse Diode: D1 – D6
- Freewheeling Diode: D13
- Rectifier Diode: D7 – D12



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Characteristics						
Symbol	Conditions		min.	typ.	max.	Unit
Inverter - IGBT						
t _{d(off)}	V _{CC} = 600 V	T _j = 25 °C		250		ns
	I _C = 75 A	T _j = 150 °C		340		ns
	R _{G on} = 2.3 Ω	T _j = 175 °C		365		ns
t _f	R _{G off} = 2.3 Ω	T _j = 25 °C		56		ns
	V _{GE} = +15/-15 V	T _j = 150 °C		86		ns
		T _j = 175 °C		103		ns
E _{off}	@ T _j = 150 °C: di/dt _{on} = 1940 A/μs	T _j = 25 °C		4.7		mJ
	di/dt _{off} = 780 A/μs	T _j = 150 °C		8.1		mJ
	dv/dt = 3650 V/μs	T _j = 175 °C		8.8		mJ
R _{th(j-s)}	per IGBT, λ _{paste} =0.8 W/(mK)			0.68		K/W
R _{th(j-s)}	per IGBT, λ _{paste} =2.5 W/(mK)			0.53		K/W
Chopper - IGBT						
V _{CE(sat)}	I _C = 75 A	T _j = 25 °C		1.55	1.70	V
	V _{GE} = 15 V	T _j = 150 °C		1.73	1.88	V
	chiplevel	T _j = 175 °C		1.77	1.92	V
V _{CE0}		T _j = 25 °C		1.00	1.05	V
	chiplevel	T _j = 150 °C		0.80	0.85	V
		T _j = 175 °C		0.75	0.80	V
r _{CE}		T _j = 25 °C		7.3	8.7	mΩ
	V _{GE} = 15 V	T _j = 150 °C		12	14	mΩ
	chiplevel	T _j = 175 °C		14	15	mΩ
V _{GE(th)}	V _{GE} = V _{CE} , I _C = 1.7 mA		5.15	5.8	6.45	V
I _{CES}	V _{GE} = 0 V, V _{CE} = 1200 V, T _j = 25 °C				1	mA
C _{ies}	V _{CE} = 25 V V _{GE} = 0 V	f = 1 MHz		15.10		nF
C _{oes}		f = 1 MHz		0.19		nF
C _{res}		f = 1 MHz		0.54		nF
Q _G	V _{GE} = - 8V ... + 15 V			1050		nC
R _{Gint}	T _j = 25 °C			2.0		Ω
t _{d(on)}	V _{CC} = 600 V I _C = 75 A R _{G on} = 2.3 Ω R _{G off} = 2.3 Ω V _{GE} = +15/-15 V @ T _j = 150 °C: di/dt _{on} = 1940 A/μs di/dt _{off} = 780 A/μs dv/dt = 3650 V/μs	T _j = 25 °C		137		ns
		T _j = 150 °C		142		ns
		T _j = 175 °C		142		ns
t _r		T _j = 25 °C		35		ns
		T _j = 150 °C		41		ns
		T _j = 175 °C		44		ns
E _{on}		T _j = 25 °C		6		mJ
		T _j = 150 °C		8.5		mJ
		T _j = 175 °C		9		mJ
t _{d(off)}		T _j = 25 °C		250		ns
		T _j = 150 °C		340		ns
		T _j = 175 °C		365		ns
t _f		T _j = 25 °C		56		ns
		T _j = 150 °C		86		ns
		T _j = 175 °C		103		ns
E _{off}		T _j = 25 °C		4.7		mJ
	T _j = 150 °C		8.1		mJ	
	T _j = 175 °C		8.8		mJ	
R _{th(j-s)}	per IGBT, λ _{paste} =0.8 W/(mK)			0.68		K/W
R _{th(j-s)}	per IGBT, λ _{paste} =2.5 W/(mK)			0.53		K/W

SKiiP 37NAB12T7V1



MiniSKiiP® 3

3-phase Converter-Inverter-Brake (CIB)

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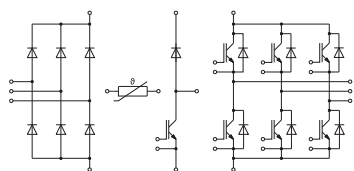
Features*

- 1200V Generation 7 IGBTs (T7)
- Robust and soft switching freewheeling diodes in CAL technology
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- Highly reliable spring contacts for electrical connections
- UL recognized: File no. E63532

Remarks

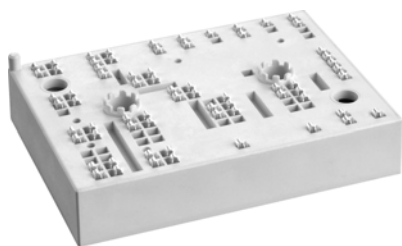
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- Product reliability results valid for $T_j \leq 150^\circ\text{C}$; $T_{j,op} > 150^\circ\text{C}$ during overload (Details see AN19-002)
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- Inverse Diode: D1 – D6
- Freewheeling Diode: D13
- Rectifier Diode: D7 – D12

Characteristics					
Symbol	Conditions		min.	typ.	max. Unit
Inverse - Diode					
$V_F = V_{EC}$	$I_F = 75\text{ A}$	$T_j = 25^\circ\text{C}$		2.17	2.49 V
	$V_{GE} = 0\text{ V}$	$T_j = 150^\circ\text{C}$		2.11	2.42 V
	chipelevel	$T_j = 175^\circ\text{C}$		1.96	2.27 V
V_{F0}		$T_j = 25^\circ\text{C}$		1.30	1.50 V
	chipelevel	$T_j = 150^\circ\text{C}$		0.90	1.10 V
		$T_j = 175^\circ\text{C}$		0.82	0.98 V
r_F		$T_j = 25^\circ\text{C}$		12	13 mΩ
	chipelevel	$T_j = 150^\circ\text{C}$		16	18 mΩ
		$T_j = 175^\circ\text{C}$		15	17 mΩ
I_{RRM}		$T_j = 25^\circ\text{C}$		50	A
		$T_j = 150^\circ\text{C}$		67	A
	$V_{CC} = 600\text{ V}$	$T_j = 175^\circ\text{C}$		80	A
Q_{rr}	$I_F = 75\text{ A}$	$T_j = 25^\circ\text{C}$		4	μC
	$V_{GE} = -15\text{ V}$	$T_j = 150^\circ\text{C}$		11.6	μC
		$T_j = 175^\circ\text{C}$		12.2	μC
E_{rr}	@ $T_j = 150^\circ\text{C}$:	$T_j = 25^\circ\text{C}$		1.4	mJ
	$di/dt_{off} = 1930\text{ A/μs}$	$T_j = 150^\circ\text{C}$		4.5	mJ
		$T_j = 175^\circ\text{C}$		6	mJ
$R_{th(j-s)}$	per Diode, $\lambda_{paste} = 0.8\text{ W/(mK)}$			0.77	K/W
$R_{th(j-s)}$	per Diode, $\lambda_{paste} = 2.5\text{ W/(mK)}$			0.62	K/W
Freewheeling - Diode					
$V_F = V_{EC}$	$I_F = 75\text{ A}$	$T_j = 25^\circ\text{C}$		2.17	2.49 V
	$V_{GE} = 0\text{ V}$	$T_j = 150^\circ\text{C}$		2.11	2.42 V
	chipelevel	$T_j = 175^\circ\text{C}$		1.96	2.27 V
V_{F0}		$T_j = 25^\circ\text{C}$		1.30	1.50 V
	chipelevel	$T_j = 150^\circ\text{C}$		0.90	1.10 V
		$T_j = 175^\circ\text{C}$		0.82	0.98 V
r_F		$T_j = 25^\circ\text{C}$		12	13 mΩ
	chipelevel	$T_j = 150^\circ\text{C}$		16	18 mΩ
		$T_j = 175^\circ\text{C}$		15	17 mΩ
I_{RRM}		$T_j = 25^\circ\text{C}$		50	A
		$T_j = 150^\circ\text{C}$		67	A
	$V_{CC} = 600\text{ V}$	$T_j = 175^\circ\text{C}$		80	A
Q_{rr}	$I_F = 75\text{ A}$	$T_j = 25^\circ\text{C}$		4	μC
	$V_{GE} = -15\text{ V}$	$T_j = 150^\circ\text{C}$		11.6	μC
		$T_j = 175^\circ\text{C}$		12.2	μC
E_{rr}	@ $T_j = 150^\circ\text{C}$:	$T_j = 25^\circ\text{C}$		1.4	mJ
	$di/dt_{off} = 1930\text{ A/μs}$	$T_j = 150^\circ\text{C}$		4.5	mJ
		$T_j = 175^\circ\text{C}$		6	mJ
$R_{th(j-s)}$	per Diode, $\lambda_{paste} = 0.8\text{ W/(mK)}$			0.77	K/W
$R_{th(j-s)}$	per Diode, $\lambda_{paste} = 2.5\text{ W/(mK)}$			0.62	K/W



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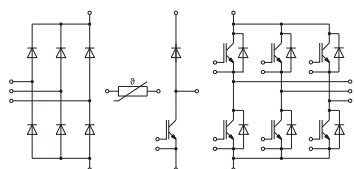
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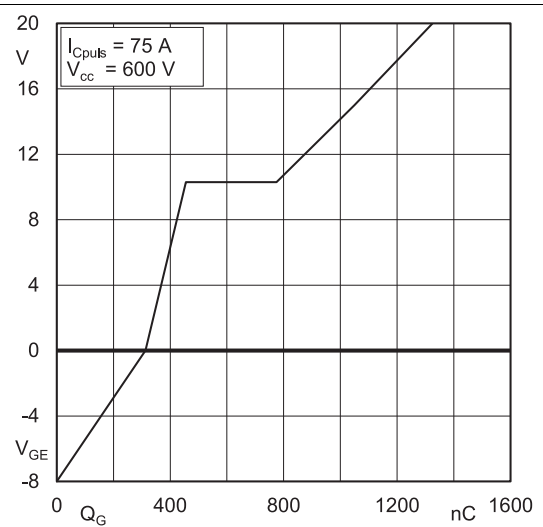
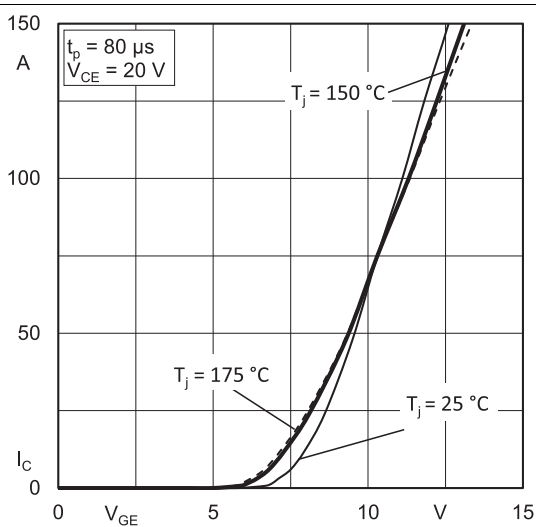
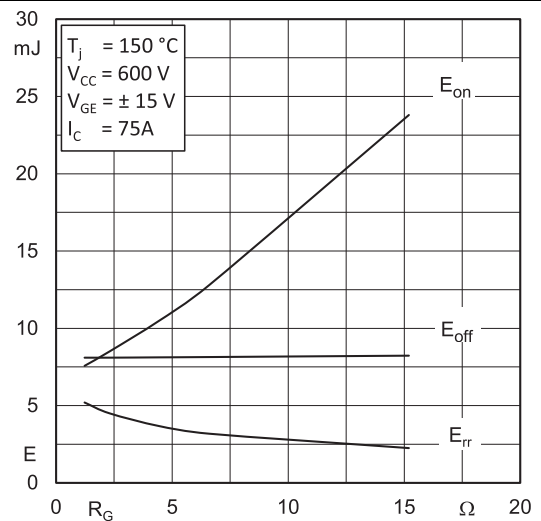
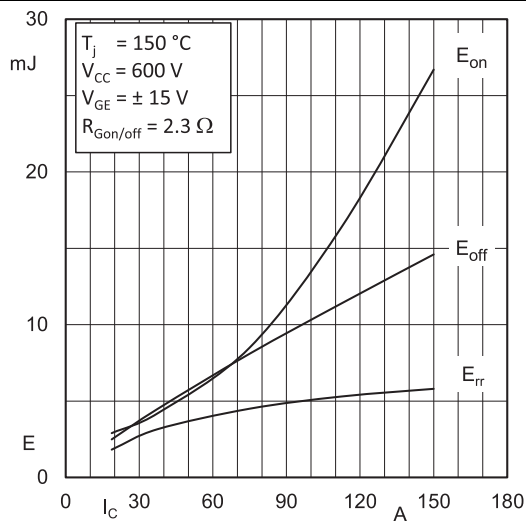
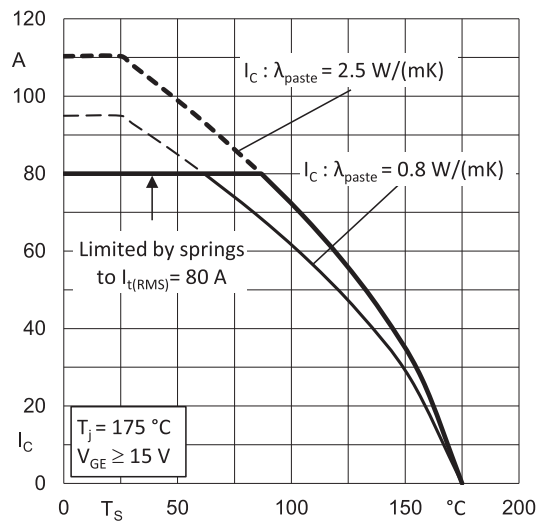
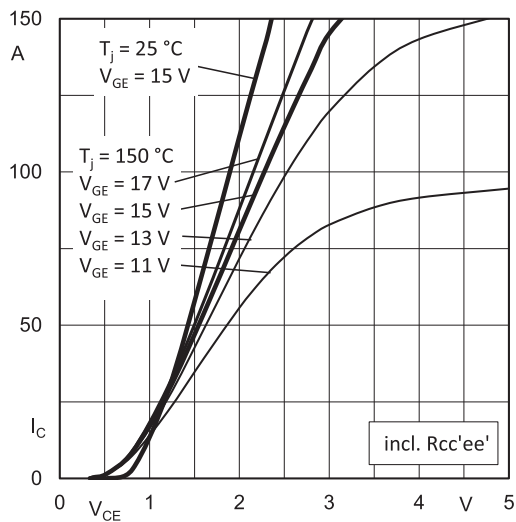
Remarks

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- Product reliability results valid for $T_j \leq 150^\circ\text{C}$; $T_{j,op} > 150^\circ\text{C}$ during overload (Details see AN19-002)
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- Freewheeling Diode: D13
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Characteristics						
Symbol	Conditions		min.	typ.	max.	Unit
Rectifier - Diode						
V _F	I _F = 26 A chiplevel	T _j = 25 °C		0.97	1.20	V
		T _j = 150 °C		0.84	1.07	V
		T _j = 175 °C		0.82	1.05	V
V _{F0}	chiplevel	T _j = 25 °C		0.89	1.09	V
		T _j = 150 °C		0.73	0.92	V
		T _j = 175 °C		0.69	0.88	V
r _F	chiplevel	T _j = 25 °C		3.1	4.2	mΩ
		T _j = 150 °C		4.4	5.9	mΩ
		T _j = 175 °C		5.0	6.5	mΩ
I _R	T _j = 150 °C, V _{RRM}				1.7	mA
R _{th(j-s)}	per Diode, λ _{paste} =0.8 W/(mK)			0.88		K/W
R _{th(j-s)}	per Diode, λ _{paste} =2.5 W/(mK)			0.74		K/W
Module						
M _s	to heat sink		2		2.5	Nm
w				82		g
L _{CE}				-		nH
Temperature Sensor						
R ₁₀₀	T _r =100°C (R ₂₅ =1000Ω)			1670 ± 3%		Ω
R _(T)	R _(T) =1000Ω[1+A(T-25°C)+B(T-25°C) ²] , A = 7.635*10 ⁻³ °C ⁻¹ , B = 1.731*10 ⁻⁵ °C ⁻²					



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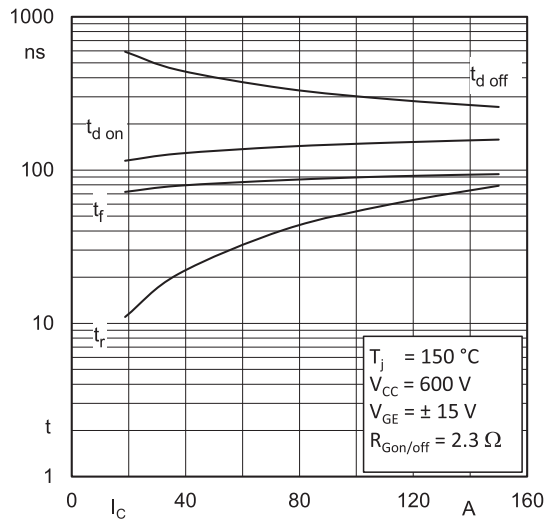


Fig. 7: Typ. switching times vs. I_C

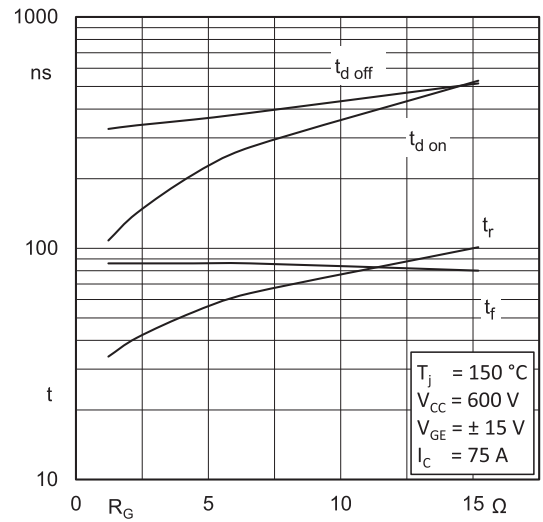


Fig. 8: Typ. switching times vs. gate resistor R_G

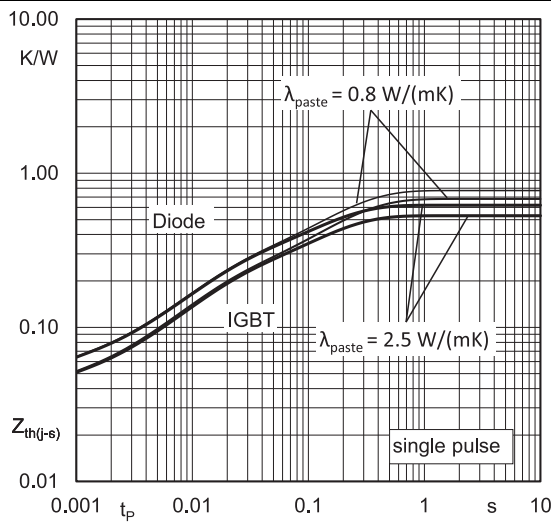


Fig. 9: Typ. transient thermal impedance

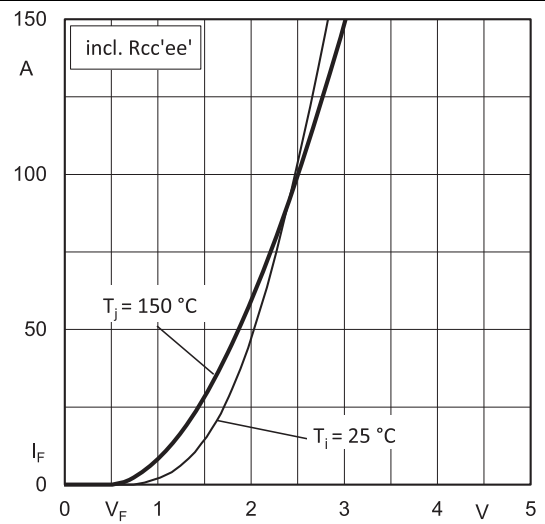


Fig. 10: Typ. CAL diode forward characteristic

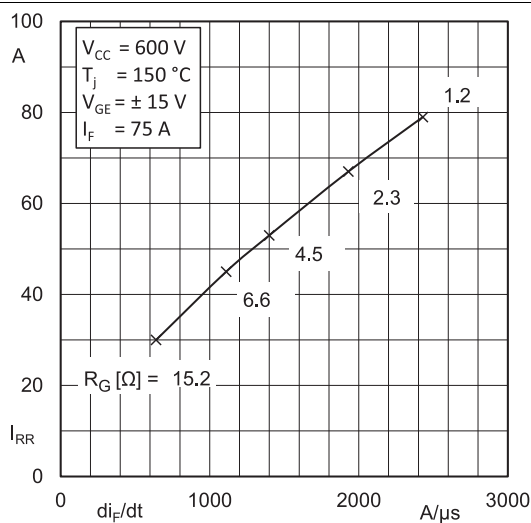


Fig. 11: Typ. CAL diode peak reverse recovery current

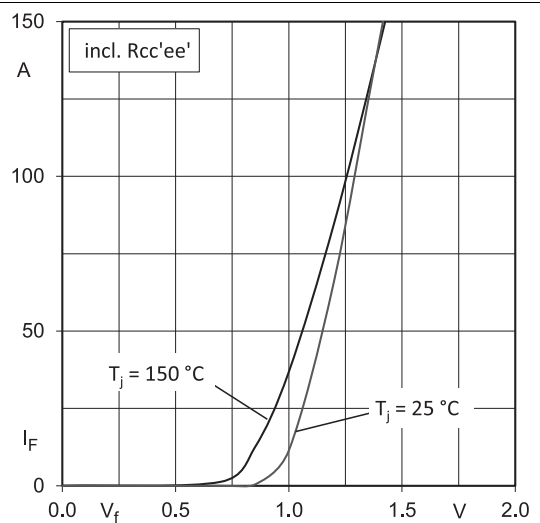
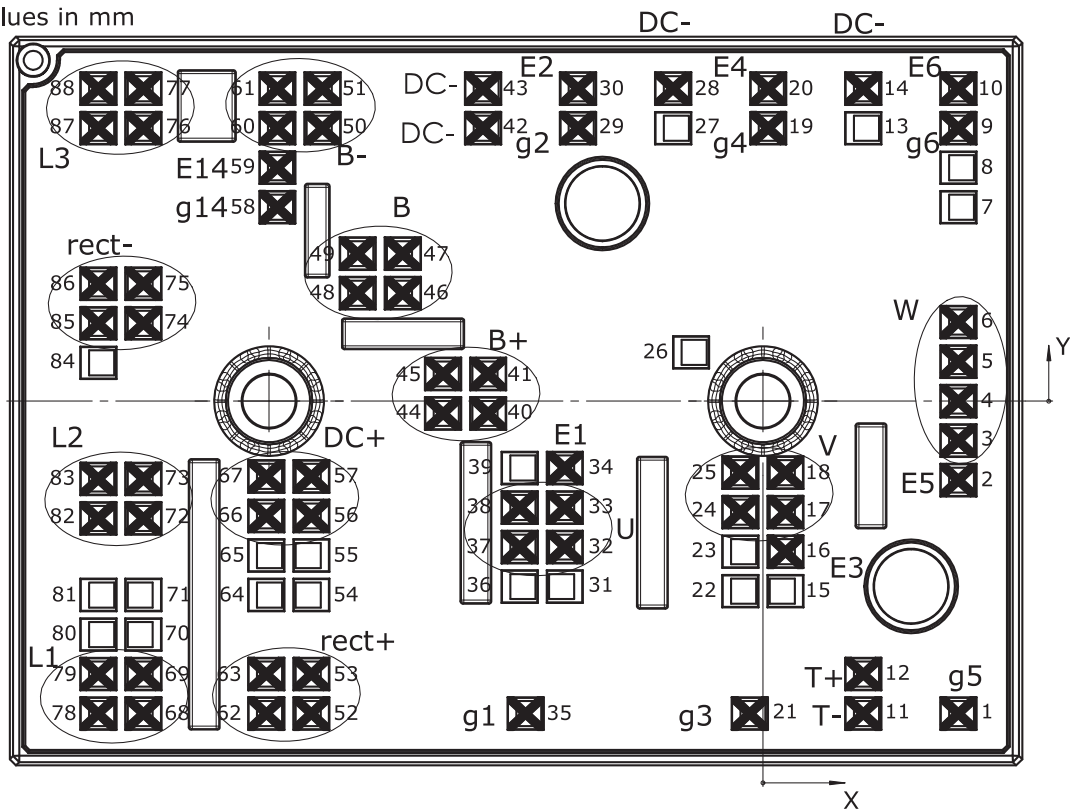


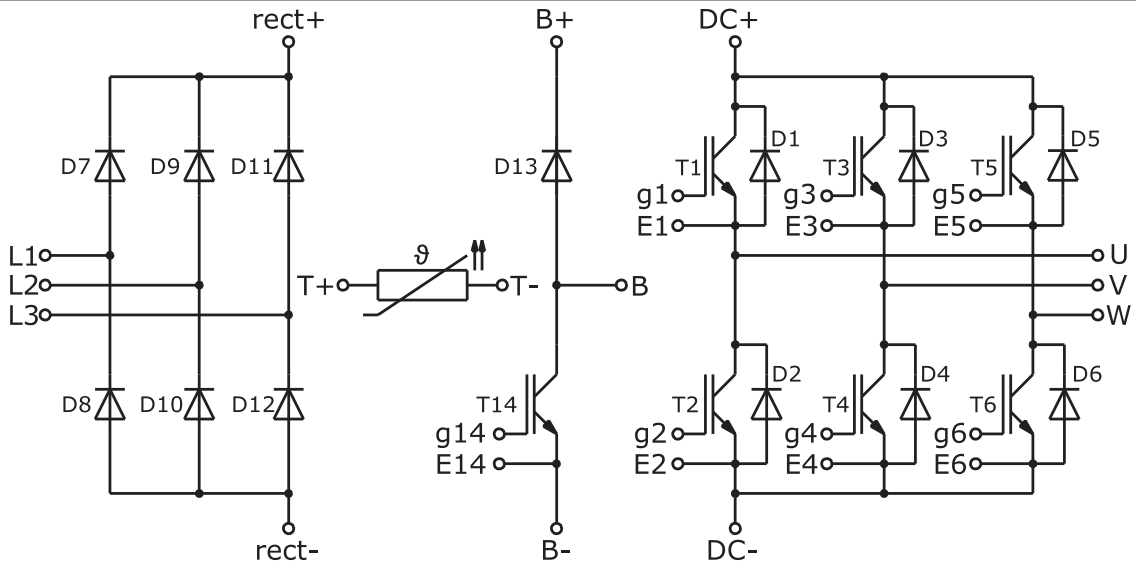
Fig. 12: Typ. input bridge forward characteristic

Pin out											
Pin	X	Y	Function	Pin	X	Y	Function	Pin	X	Y	Function
1	15,83	-25,30	g5	31	-16,05	-15,02		61	-39,33	25,30	B-
2	15,83	-6,40	E5	32	-16,05	-11,82	U	62	-40,23	-25,30	rect+
3	15,83	-3,20	W	33	-16,05	-8,62	U	63	-40,23	-22,10	rect+
4	15,83	0	W	34	-16,05	-5,42	E1	64	-40,23	-15,70	
5	15,83	3,20	W	35	-19,70	-25,30	g1	65	-40,23	-12,50	
6	15,83	6,40	W	36	-19,70	-15,02		66	-40,23	-9,30	DC+
7	15,83	15,70		37	-19,70	-11,82	U	67	-40,23	-6,10	DC+
8	15,83	18,90		38	-19,70	-8,62	U	68	-50,18	-25,30	L1
9	15,83	22,10	g6	39	-19,70	-5,42		69	-50,18	-22,10	L1
10	15,83	25,30	E6	40	-22,26	-1,00	B+	70	-50,18	-18,90	
11	8,13	-25,30	T-	41	-22,26	2,20	B+	71	-50,18	-15,70	
12	8,13	-22,10	T+	42	-22,68	22,10	DC-	72	-50,18	-9,50	L2
13	8,13	22,10		43	-22,68	25,30	DC-	73	-50,18	-6,30	L2
14	8,13	25,30	DC-	44	-25,91	-1,00	B+	74	-50,18	6,30	rect-
15	1,83	-15,39		45	-25,91	2,20	B+	75	-50,18	9,50	rect-
16	1,83	-12,19	E3	46	-29,18	8,74	B	76	-50,18	22,10	L3
17	1,83	-8,99	V	47	-29,18	11,94	B	77	-50,18	25,30	L3
18	1,83	-5,79	V	48	-32,83	8,74	B	78	-53,83	-25,30	L1
19	0,43	22,10	g4	49	-32,83	11,94	B	79	-53,83	-22,10	L1
20	0,43	25,30	E4	50	-35,68	22,10	B-	80	-53,83	-18,90	
21	-1,08	-25,30	g3	51	-35,68	25,30	B-	81	-53,83	-15,70	
22	-1,83	-15,39		52	-36,58	-25,30	rect+	82	-53,83	-9,50	L2
23	-1,83	-12,19		53	-36,58	-22,10	rect+	83	-53,83	-6,30	L2
24	-1,83	-8,99	V	54	-36,58	-15,70		84	-53,83	3,10	
25	-1,83	-5,79	V	55	-36,58	-12,50		85	-53,83	6,30	rect-
26	-5,83	3,95		56	-36,58	-9,30	DC+	86	-53,83	9,50	rect-
27	-7,28	22,10		57	-36,58	-6,10	DC+	87	-53,83	22,10	L3
28	-7,28	25,30	DC-	58	-39,33	15,70	g14	88	-53,83	25,30	L3
29	-14,98	22,10	g2	59	-39,33	18,90	E14				
30	-14,98	25,30	E2	60	-39,33	22,10	B-				

all values in mm



Pinout



Pinout

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

*IMPORTANT INFORMATION AND WARNINGS

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