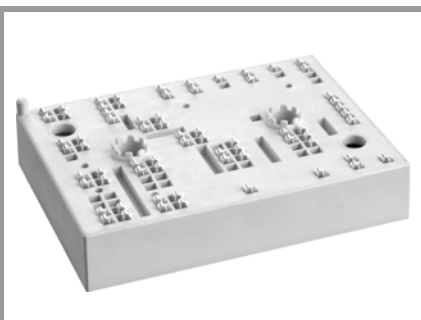


# SKiiP 39GA12T4V1



MiniSKiiP® 3

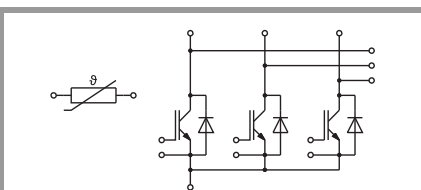
## SKiiP 39GA12T4V1

### 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

### 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  $T_{J,op} = -40 \dots +150^\circ\text{C}$ )
- Please refer to MiniSKiiP "Technical Explanations" and "Mounting Instructions" for further information

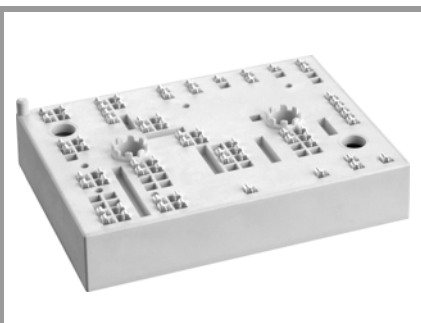


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Absolute Maximum Ratings				
Symbol	Conditions	Values	Unit	
<b>Inverter - IGBT</b>				
$V_{CES}$	$T_J = 25^\circ\text{C}$	1200	V	
$I_C$	$\lambda_{paste}=0.8 \text{ W/(mK)}$	$T_s = 25^\circ\text{C}$	165	A
	$T_J = 175^\circ\text{C}$	$T_s = 70^\circ\text{C}$	134	A
$I_C$	$\lambda_{paste}=2.5 \text{ W/(mK)}$	$T_s = 25^\circ\text{C}$	214	A
	$T_J = 175^\circ\text{C}$	$T_s = 70^\circ\text{C}$	174	A
$I_{Cnom}$		150	A	
$I_{CRM}$		450	A	
$V_{GES}$		-20 ... 20	V	
$t_{psc}$	$V_{CC} = 800 \text{ V}$ $V_{GE} \leq 15 \text{ V}$ $V_{CES} \leq 1200 \text{ V}$	$T_J = 150^\circ\text{C}$	10	$\mu\text{s}$
$T_J$		-40 ... 175	$^\circ\text{C}$	
<b>Inverse - Diode</b>				
$V_{RRM}$	$T_J = 25^\circ\text{C}$	1200	V	
$I_F$	$\lambda_{paste}=0.8 \text{ W/(mK)}$	$T_s = 25^\circ\text{C}$	136	A
	$T_J = 175^\circ\text{C}$	$T_s = 70^\circ\text{C}$	107	A
$I_F$	$\lambda_{paste}=2.5 \text{ W/(mK)}$	$T_s = 25^\circ\text{C}$	163	A
	$T_J = 175^\circ\text{C}$	$T_s = 70^\circ\text{C}$	130	A
$I_{FRM}$		450	A	
$I_{FSM}$	$t_p = 10 \text{ ms, sin } 180^\circ, T_J = 150^\circ\text{C}$	900	A	
$T_J$		-40 ... 175	$^\circ\text{C}$	
<b>Module</b>				
$I_{t(RMS)}$	$T_{terminal} = 80^\circ\text{C}, 20 \text{ A per spring}$	160	A	
$T_{stg}$	module without TIM	-40 ... 125	$^\circ\text{C}$	
$V_{isol}$	AC sinus 50 Hz, $t = 1 \text{ min}$	2500	V	

Characteristics					
Symbol	Conditions	min.	typ.	max.	Unit
<b>Inverter - IGBT</b>					
$V_{CE(sat)}$	$I_C = 150 \text{ A}$ $V_{GE} = 15 \text{ V}$ chipelevel	$T_J = 25^\circ\text{C}$	1.85	2.10	V
		$T_J = 150^\circ\text{C}$	2.25	2.45	V
$V_{CE0}$	chipelevel	$T_J = 25^\circ\text{C}$	0.80	0.90	V
		$T_J = 150^\circ\text{C}$	0.70	0.80	V
$r_{CE}$	$V_{GE} = 15 \text{ V}$ chipelevel	$T_J = 25^\circ\text{C}$	7.0	8.0	$\text{m}\Omega$
		$T_J = 150^\circ\text{C}$	10	11	$\text{m}\Omega$
$V_{GE(th)}$	$V_{GE} = V_{CE}, I_C = 6 \text{ mA}$	5	5.8	6.5	V
$I_{CES}$	$V_{GE} = 0 \text{ V}, V_{CE} = 1200 \text{ V}, T_J = 25^\circ\text{C}$			1.5	mA
$C_{ies}$	$V_{CE} = 25 \text{ V}$ $V_{GE} = 0 \text{ V}$	$f = 1 \text{ MHz}$	8.80		nF
$C_{oes}$		$f = 1 \text{ MHz}$	0.58		nF
$C_{res}$		$f = 1 \text{ MHz}$	0.47		nF
$Q_G$	$V_{GE} = -8 \text{ V} \dots +15 \text{ V}$		850		nC
$R_{Gint}$	$T_J = 25^\circ\text{C}$		5.0		$\Omega$
$t_{d(on)}$	$V_{CC} = 600 \text{ V}$	$T_J = 150^\circ\text{C}$	165		ns
$t_r$	$I_C = 150 \text{ A}$ $R_{Gon} = 1 \Omega$	$T_J = 150^\circ\text{C}$	50		ns
		$T_J = 150^\circ\text{C}$	22.5		mJ
$E_{on}$	$R_{Goff} = 1 \Omega$	$T_J = 150^\circ\text{C}$			mJ
$t_{d(off)}$	$di/dt_{on} = 2840 \text{ A}/\mu\text{s}$	$T_J = 150^\circ\text{C}$	390		ns
$t_f$	$di/dt_{off} = 1880 \text{ A}/\mu\text{s}$	$T_J = 150^\circ\text{C}$	80		ns
$E_{off}$	$V_{GE} = +15/-15 \text{ V}$	$T_J = 150^\circ\text{C}$	14		mJ
$R_{th(j-s)}$	per IGBT, $\lambda_{paste}=0.8 \text{ W/(mK)}$		0.33		K/W
$R_{th(j-s)}$	per IGBT, $\lambda_{paste}=2.5 \text{ W/(mK)}$		0.21		K/W

# SKiiP 39GA12T4V1



MiniSKiiP® 3

## SKiiP 39GA12T4V1

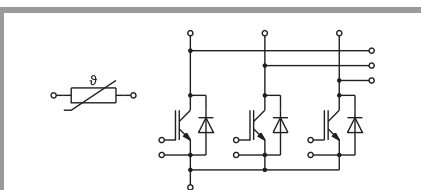
### Features\*

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

### 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  $T_{j,op} = -40 \dots +150^\circ\text{C}$ )
- Please refer to MiniSKiiP "Technical Explanations" and "Mounting Instructions" for further information

Characteristics						
Symbol	Conditions		min.	typ.	max.	Unit
<b>Inverse - Diode</b>						
$V_F = V_{EC}$	$I_F = 150\text{ A}$ $V_{GE} = 0\text{ V}$ chiplevel	$T_j = 25^\circ\text{C}$		2.14	2.46	V
		$T_j = 150^\circ\text{C}$		2.07	2.38	V
$V_{F0}$	chiplevel	$T_j = 25^\circ\text{C}$		1.30	1.50	V
		$T_j = 150^\circ\text{C}$		0.90	1.10	V
$r_F$	chiplevel	$T_j = 25^\circ\text{C}$		5.6	6.4	m $\Omega$
		$T_j = 150^\circ\text{C}$		7.8	8.5	m $\Omega$
$I_{RRM}$	$I_F = 150\text{ A}$	$T_j = 150^\circ\text{C}$		188		A
$Q_{rr}$	$di/dt_{off} = 4020\text{ A}/\mu\text{s}$ $V_{GE} = +15/-15\text{ V}$	$T_j = 150^\circ\text{C}$		27		$\mu\text{C}$
$E_{rr}$	$V_{CC} = 600\text{ V}$	$T_j = 150^\circ\text{C}$		11.4		mJ
$R_{th(j-s)}$	per Diode, $\lambda_{paste}=0.8\text{ W}/(\text{mK})$			0.52		K/W
$R_{th(j-s)}$	per Diode, $\lambda_{paste}=2.5\text{ W}/(\text{mK})$			0.39		K/W
<b>Module</b>						
$L_{CE}$				-		nH
$M_s$	to heat sink		2		2.5	Nm
$W$				82		g
<b>Temperature Sensor</b>						
$R_{100}$	$T_r=100^\circ\text{C}$ ( $R_{25}=1000\Omega$ )			$1670 \pm 3\%$		$\Omega$
$R_{(T)}$	$R_{(T)}=1000\Omega[1+A(T-25^\circ\text{C})+B(T-25^\circ\text{C})^2]$ , $A = 7.635 \cdot 10^{-3} \text{ }^\circ\text{C}^{-1}$ , $B = 1.731 \cdot 10^{-5} \text{ }^\circ\text{C}^{-2}$					



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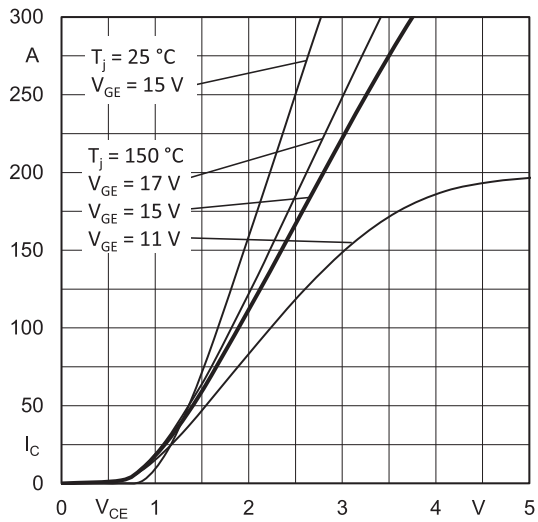


Fig. 1: Typ. output characteristic

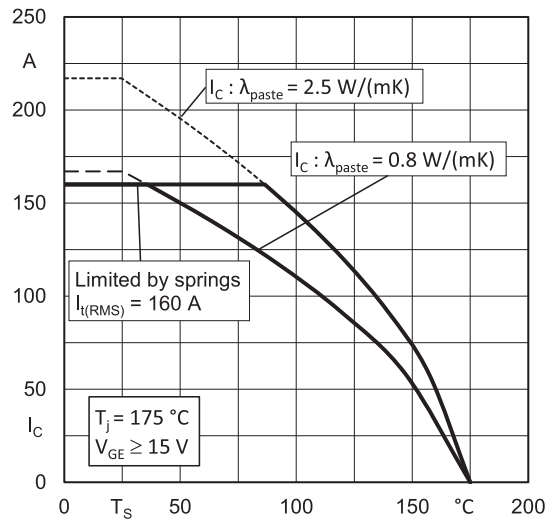


Fig. 2: Rated current vs. temperature  $I_C = f(T_S)$

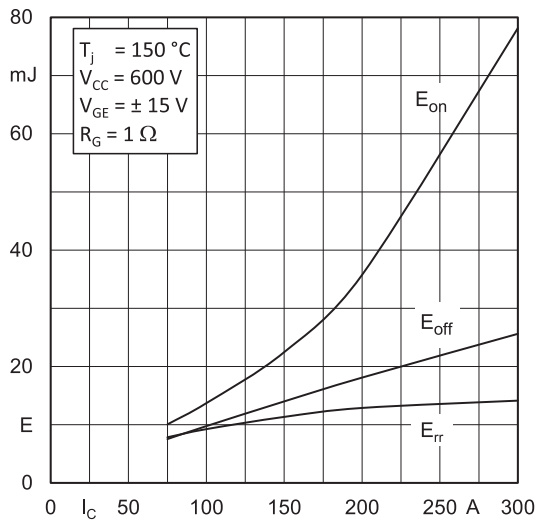


Fig. 3: Typ. turn-on /-off energy =  $f(I_C)$

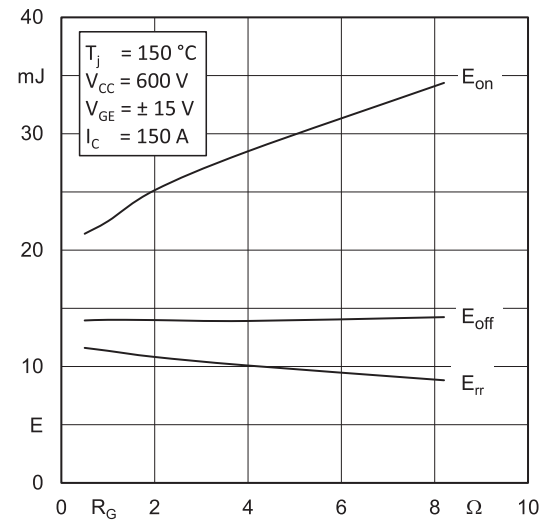


Fig. 4: Typ. turn-on /-off energy =  $f(R_G)$

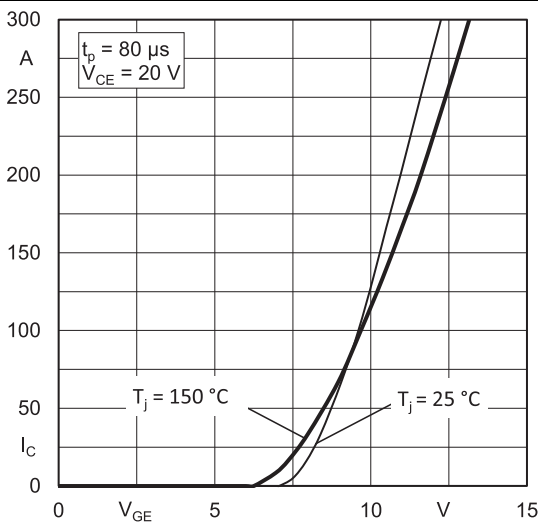


Fig. 5: Typ. transfer characteristic

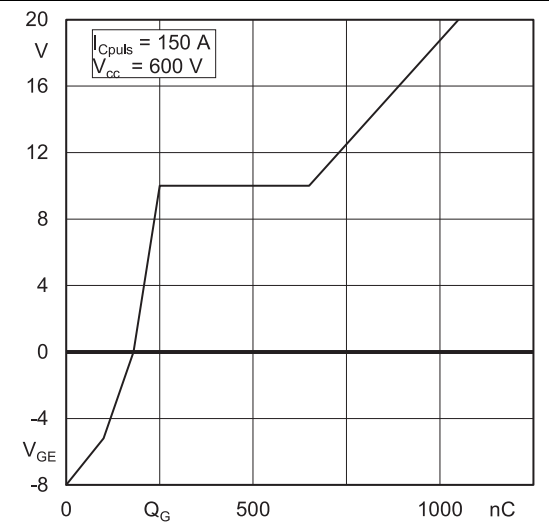
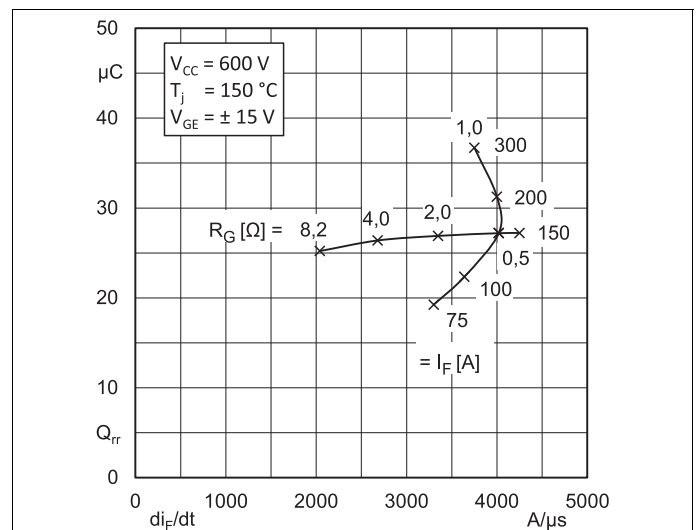
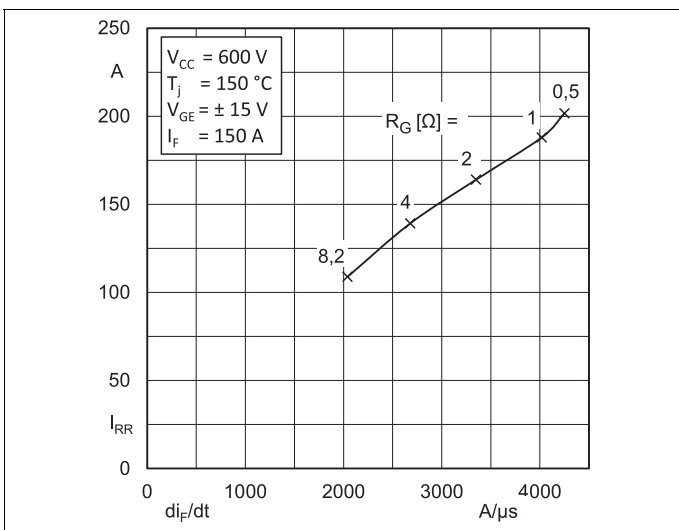
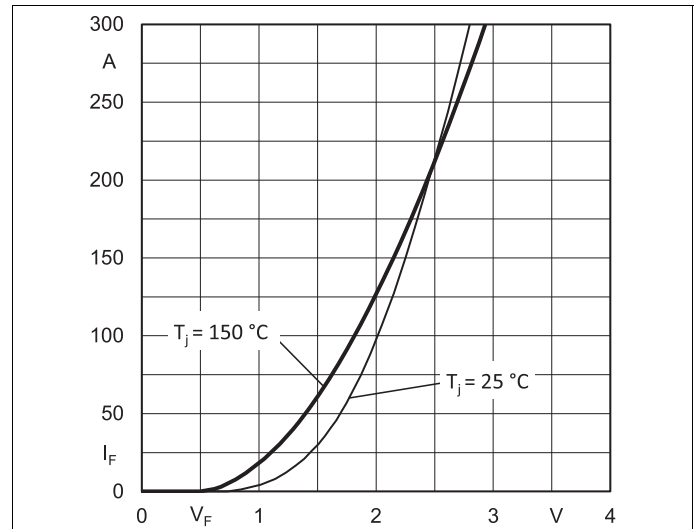
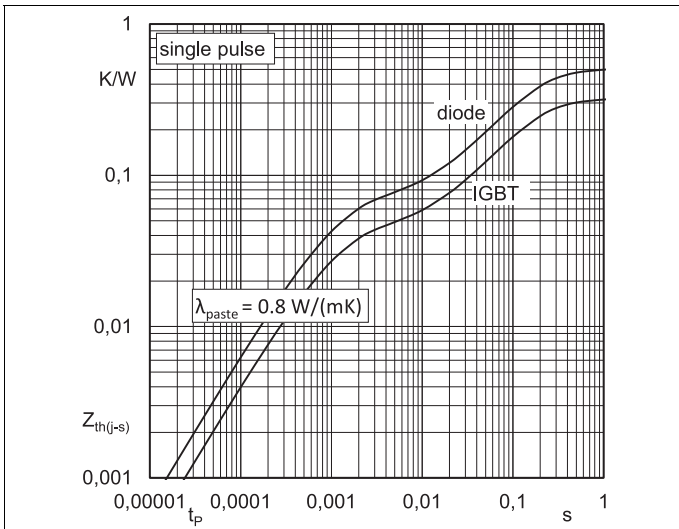
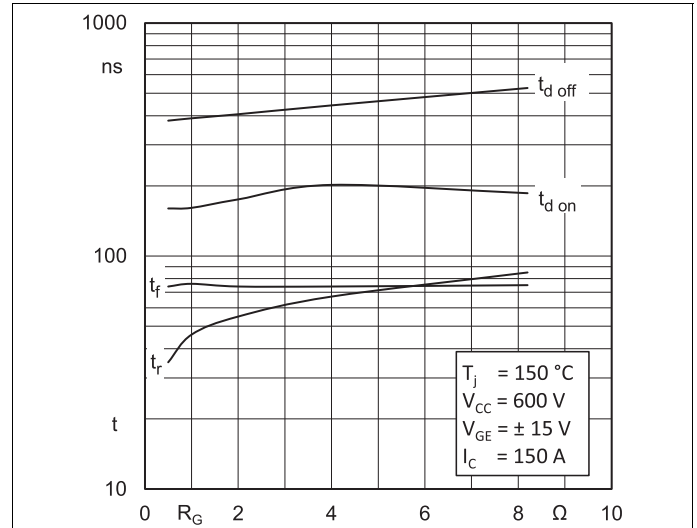
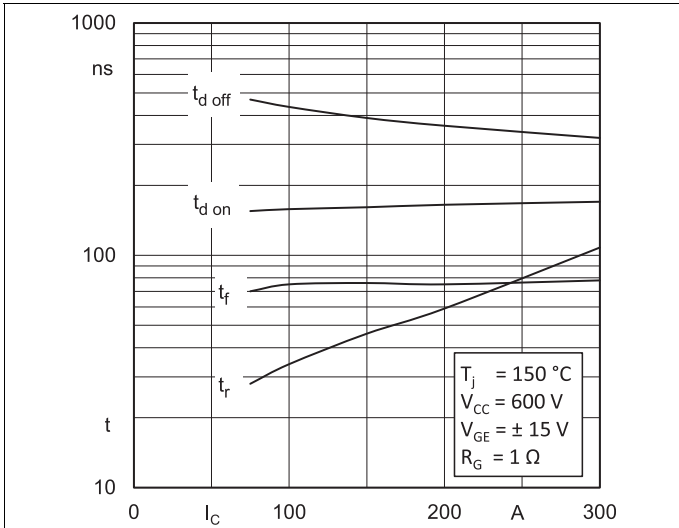


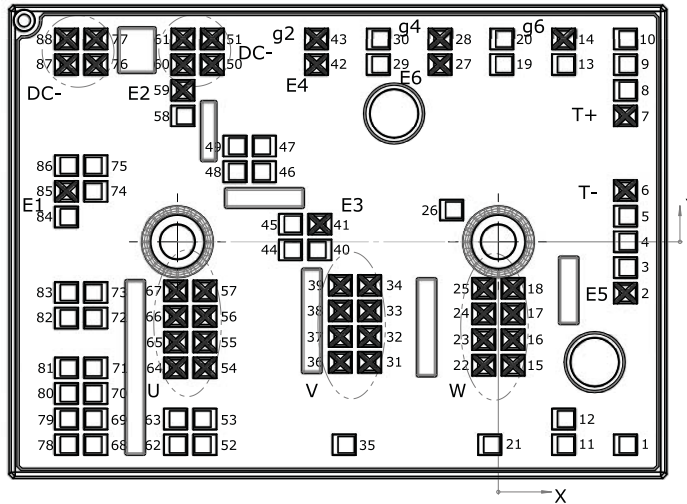
Fig. 6: Typ. gate charge characteristic



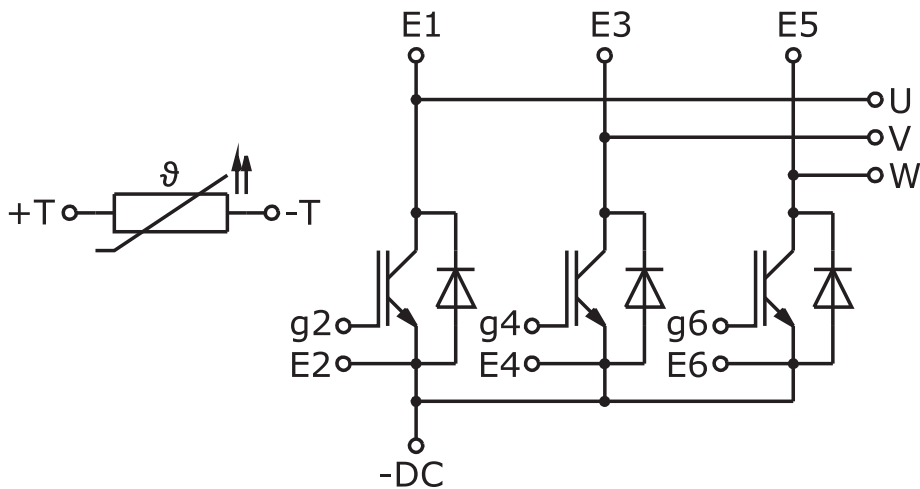
# SKiP 39GA12T4V1

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

all values in mm



Pinout and Dimensions



Pinout

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

## **\*IMPORTANT INFORMATION AND WARNINGS**

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