

SK 151 GALE 07F3 TUF



SEMITOP® 3

IGBT module

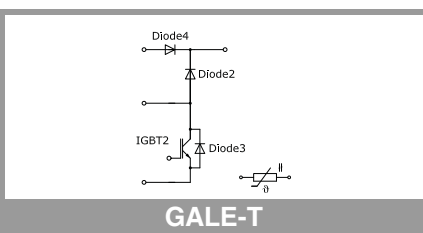
SK 151 GALE 07F3 TUF

Features*

- Compact design
- One screw mounting module
- Optimum heat transfer and isolation through direct copper bonding aluminium oxide ceramic (DBC)
- 650V Fast IGBT technology
- Ultrafast switching free-wheeling diode
- Integrated NTC temperature sensor
- UL recognized, file no. E 63 532

Typical Applications

- Switching (not for linear use)
- Inverter
- Switch mode power supply
- UPS



GALE-T

Absolute Maximum Ratings				
Symbol	Conditions		Values	Unit
IGBT 2				
V_{CES}	$T_j = 25\text{ °C}$		650	V
I_C	$T_j = 150\text{ °C}$	$T_s = 25\text{ °C}$	129	A
		$T_s = 70\text{ °C}$	96	A
I_C	$T_j = 175\text{ °C}$	$T_s = 25\text{ °C}$	145	A
		$T_s = 70\text{ °C}$	115	A
I_{Chom}			150	A
I_{CRM}			450	A
V_{GES}			-20 ... 20	V
t_{psc}	$V_{CC} = 400\text{ V}$ $V_{GE} \leq 15\text{ V}$ $V_{CES} \leq 650\text{ V}$	$T_j = 150\text{ °C}$	5	μs
T_j			-40 ... 175	$^{\circ}\text{C}$

Absolute Maximum Ratings				
Symbol	Conditions		Values	Unit
Diode 2				
V_{RRM}	$T_j = 25\text{ °C}$		600	V
I_F	$T_j = 150\text{ °C}$	$T_s = 25\text{ °C}$	116	A
		$T_s = 70\text{ °C}$	85	A
I_{Fnom}			150	A
I_{FRM}			450	A
I_{FSM}	8.3 ms sin 180°	$T_j = 25\text{ °C}$	1134	A
		$T_j = 150\text{ °C}$	988	A
T_j			-40 ... 150	$^{\circ}\text{C}$

Absolute Maximum Ratings				
Symbol	Conditions		Values	Unit
Diode 3				
V_{RRM}	$T_j = 25\text{ °C}$		600	V
I_F	$T_j = 150\text{ °C}$	$T_s = 25\text{ °C}$	25	A
		$T_s = 70\text{ °C}$	19	A
I_F	$T_j = 175\text{ °C}$	$T_s = 25\text{ °C}$	28	A
		$T_s = 70\text{ °C}$	22	A
I_{FRM}			40	A
I_{FSM}	10 ms, sin 180°, $T_j = 150\text{ °C}$		95	A
T_j			-40 ... 175	$^{\circ}\text{C}$

Absolute Maximum Ratings				
Symbol	Conditions		Values	Unit
Diode 4				
V_{RRM}			1600	V
I_F	$T_j = 150\text{ °C}$	$T_s = 25\text{ °C}$	67	A
		$T_s = 70\text{ °C}$	49	A
I_{FSM}	10 ms, sin 180°, $T_j = 150\text{ °C}$		490	A
i^2t	10 ms, sin 180°, $T_j = 150\text{ °C}$		1200	A^2s
T_j			-40 ... 150	$^{\circ}\text{C}$

SK 151 GALE 07F3 TUF



SEMITOP® 3

IGBT module

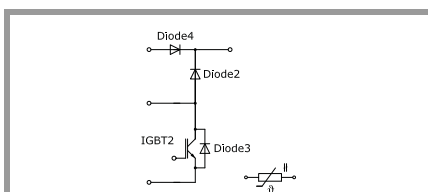
SK 151 GALE 07F3 TUF

Features*

- Compact design
- One screw mounting module
- Optimum heat transfer and isolation through direct copper bonding aluminium oxide ceramic (DBC)
- 650V Fast IGBT technology
- Ultrafast switching free-wheeling diode
- Integrated NTC temperature sensor
- UL recognized, file no. E 63 532

Typical Applications

- Switching (not for linear use)
- Inverter
- Switch mode power supply
- UPS



GALE-T

Absolute Maximum Ratings			
Symbol	Conditions	Values	Unit
Module			
$I_{t(RMS)}$	$\Delta T_{terminal}$ at PCB joint = 30 K, per pin	60	A
T_{stg}	module without TIM	-40 ... 125	°C
V_{isol}	AC, sinusoidal, 50Hz, t = 1 min	2500	V

Characteristics					
Symbol	Conditions	min.	typ.	max.	Unit
IGBT 2					
$V_{CE(sat)}$	$I_C = 150$ A $V_{GE} = 15$ V chipelevel	$T_j = 25$ °C	1.85	2.22	V
		$T_j = 150$ °C	2.18	2.55	V
V_{CE0}	chipelevel	$T_j = 25$ °C	1.10	1.20	V
		$T_j = 150$ °C	1.00	1.10	V
r_{CE}	$V_{GE} = 15$ V chipelevel	$T_j = 25$ °C	5.0	6.8	mΩ
		$T_j = 150$ °C	7.9	9.7	mΩ
$V_{GE(th)}$	$V_{GE} = V_{CE}, I_C = 2.4$ mA	4.2	5.1	5.6	V
I_{CES}	$V_{GE} = 0$ V $V_{CE} = 600$ V	$T_j = 25$ °C		0.2	mA
		$T_j = 150$ °C		-	mA
C_{ies}	$V_{CE} = 25$ V $V_{GE} = 0$ V	$f = 1$ MHz	9.30		nF
C_{oes}		$f = 1$ MHz	0.35		nF
C_{res}		$f = 1$ MHz	0.27		nF
Q_G	$V_{GE} = -15$ V...+ 15 V		1380		nC
R_{Gint}	$T_j = 25$ °C		1.6		Ω
$t_{d(on)}$	$V_{CC} = 300$ V $I_C = 150$ A	$T_j = 150$ °C	153		ns
t_r		$T_j = 150$ °C	130		ns
E_{on}	$V_{GE\ neg} = -15$ V $V_{GE\ pos} = 15$ V	$T_j = 150$ °C	8.8		mJ
		$T_j = 150$ °C	719		ns
$t_{d(off)}$	$R_{G\ on} = 15$ Ω	$T_j = 150$ °C	719		ns
t_f	$R_{G\ off} = 15$ Ω	$T_j = 150$ °C	43		ns
E_{off}	$di/dt_{on} = 974$ A/μs $di/dt_{off} = 3024$ A/μs	$T_j = 150$ °C	4		mJ
		$T_j = 150$ °C			
$R_{th(j-s)}$	per IGBT, $\lambda_{paste} = 0.8$ W/(mK)		0.41		K/W

Characteristics					
Symbol	Conditions	min.	typ.	max.	Unit
Diode 2					
V_F	$I_F = 150$ A $V_{GE} = 0$ V chipelevel	$T_j = 25$ °C	1.80	2.20	V
		$T_j = 125$ °C	1.60	2.00	V
V_{F0}	chipelevel	$T_j = 25$ °C	1.15	1.35	V
		$T_j = 125$ °C	0.85	1.05	V
r_F	chipelevel	$T_j = 25$ °C	4.3	5.7	mΩ
		$T_j = 125$ °C	5.0	6.3	mΩ
I_{RRM}	$I_F = 150$ A	$T_j = 150$ °C	150		A
Q_{rr}	$di/dt_{off} = 891$ A/μs $V_{GE} = -15$ V	$T_j = 150$ °C	3.1		μC
E_{rr}	$V_{CC} = 300$ V	$T_j = 150$ °C	0.26		mJ
$R_{th(j-s)}$	per Diode, $\lambda_{paste} = 0.8$ W/(mK)		0.62		K/W

SK 151 GALE 07F3 TUF



SEMITOP® 3

IGBT module

SK 151 GALE 07F3 TUF

Features*

- Compact design
- One screw mounting module
- Optimum heat transfer and isolation through direct copper bonding aluminium oxide ceramic (DBC)
- 650V Fast IGBT technology
- Ultrafast switching free-wheeling diode
- Integrated NTC temperature sensor
- UL recognized, file no. E 63 532

Typical Applications

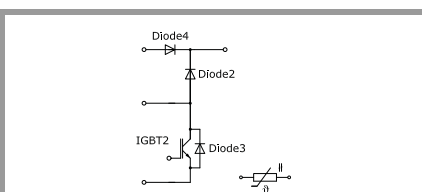
- Switching (not for linear use)
- Inverter
- Switch mode power supply
- UPS

Characteristics						
Symbol	Conditions		min.	typ.	max.	Unit
Diode 3						
V_F	$I_F = 20\text{ A}$	$T_j = 25\text{ °C}$		1.59	2.06	V
	chiplevel	$T_j = 150\text{ °C}$		1.68	2.01	V
V_{F0}	chiplevel	$T_j = 25\text{ °C}$		0.99	1.10	V
		$T_j = 150\text{ °C}$		0.80	0.89	V
r_F	chiplevel	$T_j = 25\text{ °C}$		30	48	mΩ
		$T_j = 150\text{ °C}$		44	56	mΩ
I_{RRM}				-		A
Q_{rr}				-		μC
E_{rr}	$V_{CC} = 300\text{ V}$			-		mJ
$R_{th(j-s)}$	per Diode, $\lambda_{paste}=0.8\text{ W/(mK)}$			2.34		K/W

Characteristics						
Symbol	Conditions		min.	typ.	max.	Unit
Diode 4						
V_F	$I_F = 25\text{ A}$	$T_j = 25\text{ °C}$		1.00	1.21	V
	chiplevel	$T_j = 125\text{ °C}$		0.90	1.10	V
V_{F0}	chiplevel	$T_j = 25\text{ °C}$		0.88	0.98	V
		$T_j = 125\text{ °C}$		0.73	0.83	V
r_F	chiplevel	$T_j = 25\text{ °C}$		6.8	9.2	mΩ
		$T_j = 125\text{ °C}$		6.8	11	mΩ
I_{RRM}	$I_F = 25\text{ A}$	$T_j = 125\text{ °C}$		-		A
Q_{rr}		$T_j = 125\text{ °C}$		-		μC
E_{rr}		$T_j = 125\text{ °C}$		-		mJ
$R_{th(j-s)}$	per Diode, $\lambda_{paste}=0.8\text{ W/(mK)}$			1.2		K/W

Characteristics						
Symbol	Conditions		min.	typ.	max.	Unit
Module						
M_s	to heatsink		2.25		2.5	Nm
w	weight			29		g

Characteristics						
Symbol	Conditions		min.	typ.	max.	Unit
Temperature Sensor						
R_{100}	$T_r = 100\text{ °C}$			$493 \pm 5\%$		Ω
$B_{100/125}$	$R(T) = R_{100} \exp[B_{100/125}(1/T - 1/T_{100})]$; $T[K]$;			$3550 \pm 2\%$		K



GALE-T

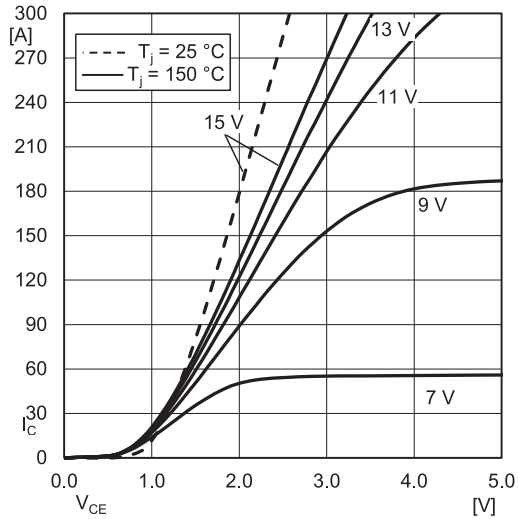


Fig. 1: Typ. output characteristic, inclusive R_{CC'+EE'}

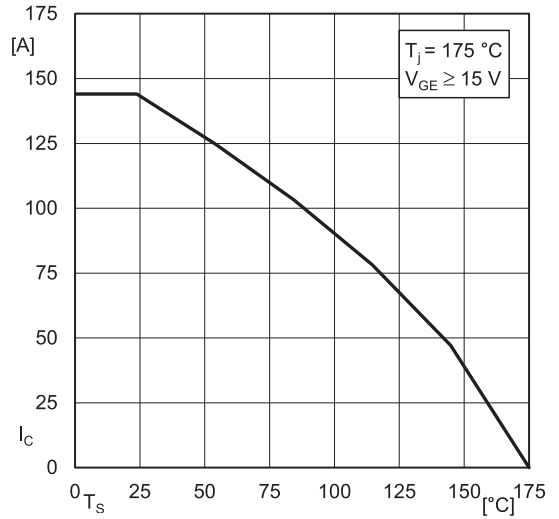


Fig. 2: Typ. rated current vs. temperature I_C = f(T_s)

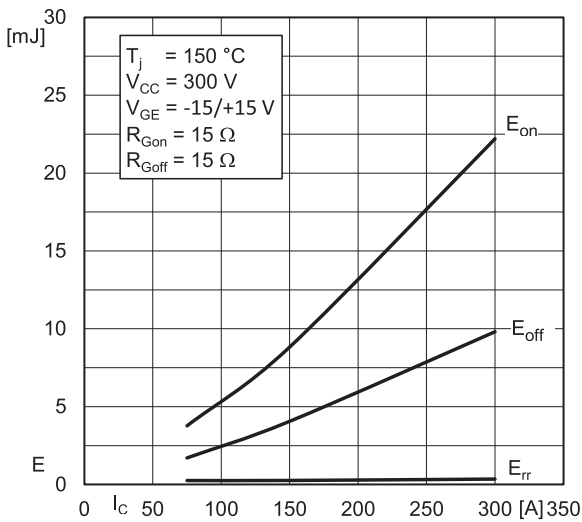


Fig. 3: Typ. turn-on /-off energy = f(I_C)

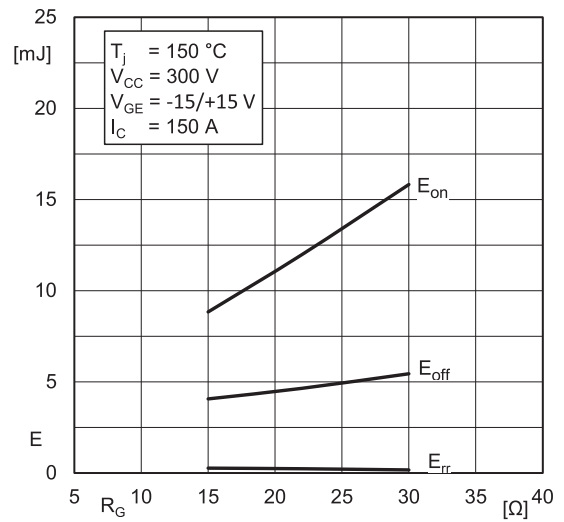


Fig. 4: Typ. turn-on /-off energy = f(R_G)

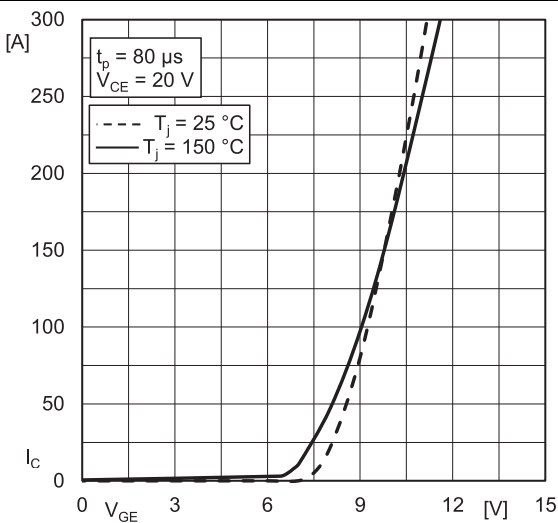


Fig. 5: Typ. transfer characteristic

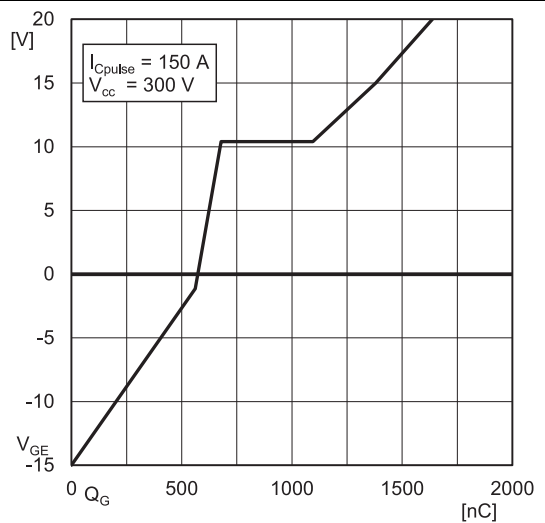


Fig. 6: Typ. gate charge characteristic

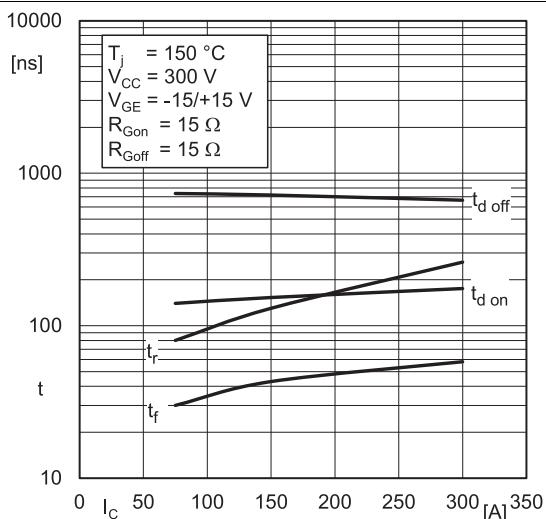


Fig. 7: Typ. switching times vs. I_C

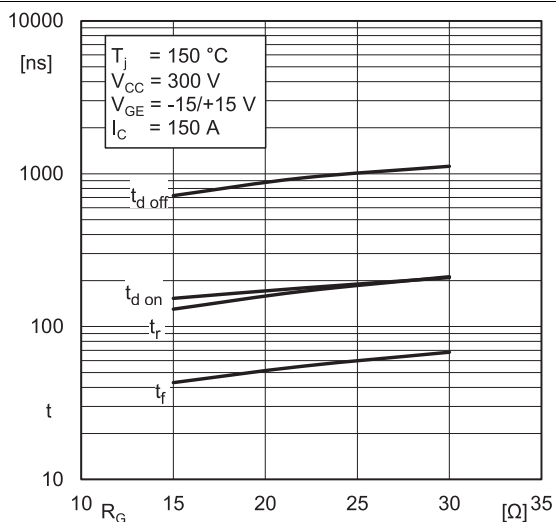


Fig. 8: Typ. switching times vs. gate resistor R_G

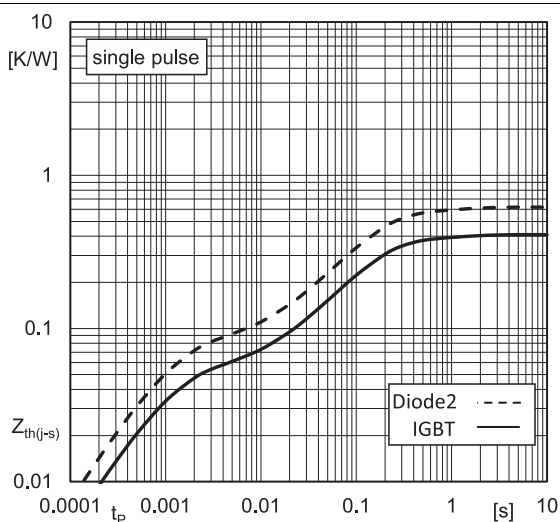


Fig. 9: Typ. transient thermal impedance of IGBT and Diode

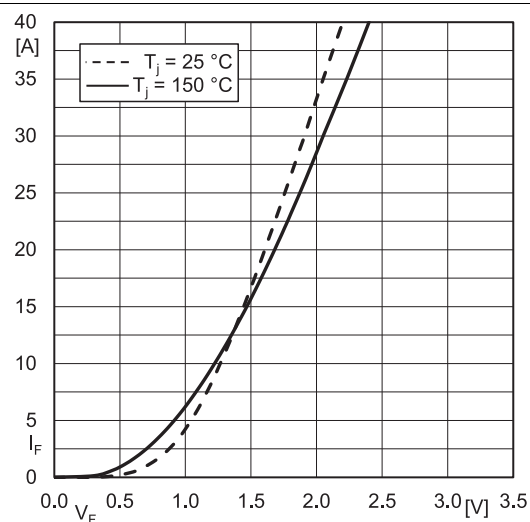


Fig. 10: Typ. Diode3 forward characteristic, incl. $R_{CC+EE'}$

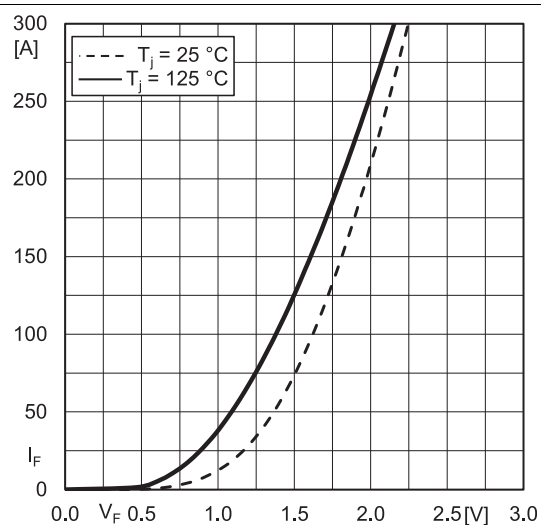


Fig. 13: Typ. Diode2 forward characteristic, incl. $R_{CC+EE'}$

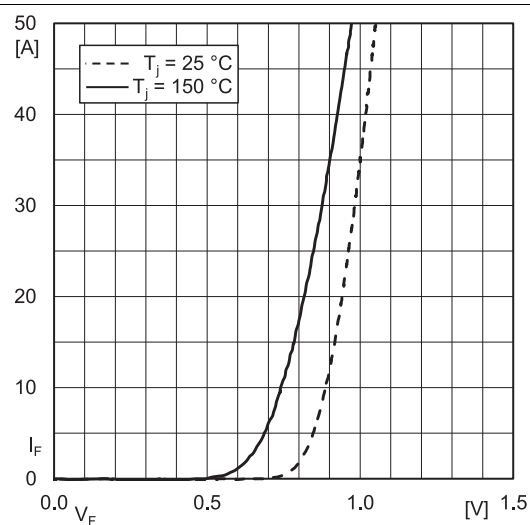
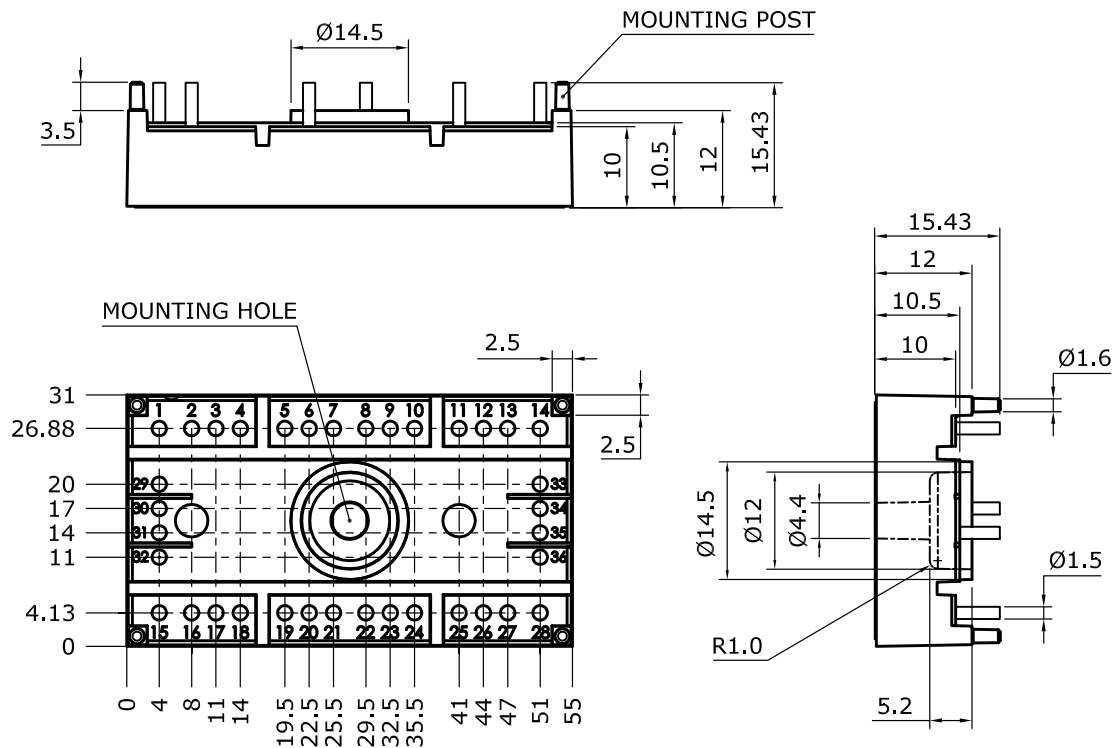


Fig. 14: Typ. Diode4 forward characteristic, incl. $R_{CC+EE'}$

SK 151 GALE 07F3 TUF

Dimensions: mm

Tolerance system: ISO 2768-m



Suggested hole diameter for solder pins in the circuit board:

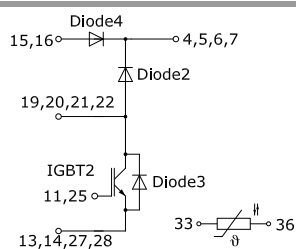
- 2.0 mm

Suggested hole diameter for the mounting post in the circuit board:

- 2.0 mm

These documents are SEMIKRON properties. SEMIKRON reserves all copyrights. All copying and transmitting of this information requires written permission. For the case of industrial property rights, SEMIKRON reserves all rights.

SEMITOP®3



GALE-T

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

***IMPORTANT INFORMATION AND WARNINGS**

The specifications of SEMIKRON products may not be considered as guarantee or assurance of product characteristics ("Beschaffenheitsgarantie"). The specifications of SEMIKRON products describe only the usual characteristics of products to be expected in typical applications, which may still vary depending on the specific application. Therefore, products must be tested for the respective application in advance. Application adjustments may be necessary. The user of SEMIKRON products is responsible for the safety of their applications embedding SEMIKRON products and must take adequate safety measures to prevent the applications from causing a physical injury, fire or other problem if any of SEMIKRON products become faulty. The user is responsible to make sure that the application design is compliant with all applicable laws, regulations, norms and standards. Except as otherwise explicitly approved by SEMIKRON in a written document signed by authorized representatives of SEMIKRON, SEMIKRON products may not be used in any applications where a failure of the product or any consequences of the use thereof can reasonably be expected to result in personal injury. No representation or warranty is given and no liability is assumed with respect to the accuracy, completeness and/or use of any information herein, including without limitation, warranties of non-infringement of intellectual property rights of any third party. SEMIKRON does not assume any liability arising out of the applications or use of any product; neither does it convey any license under its patent rights, copyrights, trade secrets or other intellectual property rights, nor the rights of others. SEMIKRON makes no representation or warranty of non-infringement or alleged non-infringement of intellectual property rights of any third party which may arise from applications. Due to technical requirements our products may contain dangerous substances. For information on the types in question please contact the nearest SEMIKRON sales office. This document supersedes and replaces all information previously supplied and may be superseded by updates. SEMIKRON reserves the right to make changes.