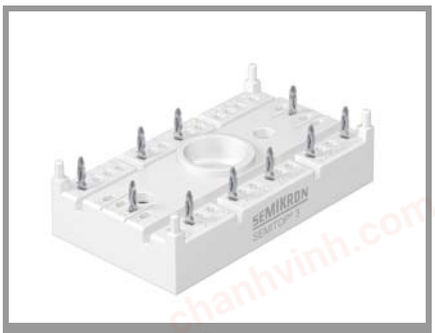
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SK45MLET12SCp



SEMITOP® 3 Press-Fit

SiC MOSFET Module

SK45MLET12SCp

Features*

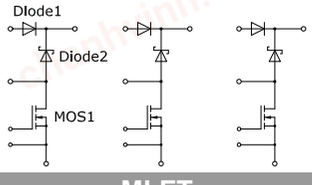
- One screw mounting module
- Fully compatible with other SEMITOP® Press-Fit types
- Improved thermal performance by aluminum oxide substrate
- Three separated Boost legs in very compact solution
- Ultra Low inductance design
- SiC 1200V Planar MOSFET
- SiC 1200V Schottky FWD
- By-pass Rectifier diodes
- Extremely high switching frequency
- UL recognized, file no. E63 532

Typical Applications

- Interleaved PFC
- Solar inverter
- UPS
- Power Supply

Remarks

By-pass diode = Diode1
FWD = Diode2



MLET

Absolute Maximum Ratings

Symbol	Conditions		Values	Unit
MOSFET 1				
V_{DSS}			1200	V
I_D	T_j = 175 °C	T_s = 25 °C	39	A
		T_s = 70 °C	32	A
I_{DM}	PW ≤ 10µs, Duty cycle ≤ 1%		160	A
$I_{DM,repetitive}$			113	A
V_{GS}			-6 ... 22	V
T_j			-40 ... 175	°C
Integrated body diode				
I_{FM}	PW ≤ 10µs, Duty cycle ≤ 1%		160	A
$I_{FM,repetitive}$			113	A

Absolute Maximum Ratings

Symbol	Conditions		Values	Unit
Diode 1				
V_{RRM}	T_j = 25 °C		1600	V
I_F	T_j = 150 °C	T_s = 25 °C	43	A
		T_s = 70 °C	32	A
I_{FSM}	10 ms, T_j = 150 °C		270	A
i^2t	10 ms, T_j = 150 °C		364	A^2s
T_j			-40 ... 150	°C

Absolute Maximum Ratings

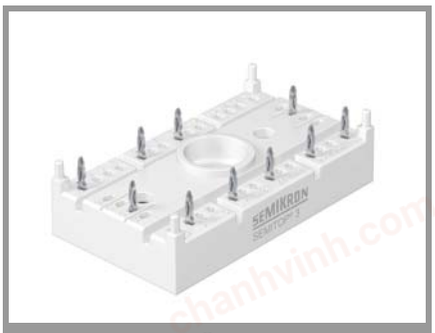
Symbol	Conditions		Values	Unit
Diode 2				
V_{RRM}	T_j = 25 °C		1200	V
I_F	T_j = 175 °C	T_s = 25 °C	56	A
		T_s = 70 °C	44	A
I_{FRM}			113	A
I_{FSM}	10 ms sin 180°	T_j = 25 °C	190	A
		T_j = 150 °C	140	A
T_j			-40 ... 175	°C

Absolute Maximum Ratings

Symbol	Conditions	Values	Unit
Module			
$I_{t(RMS)}$	$\Delta T_{terminal}$ at PCB joint = 30 K, per pin	35	A
T_{stg}	module without TIM	-40 ... 125	°C
V_{isol}	AC, sinusoidal, t = 1 min	2500	V

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SEMITOP® 3 Press-Fit

SiC MOSFET Module

SK45MLET12SCp

Features*

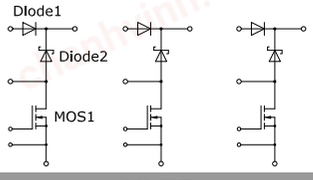
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Typical Applications

- Interleaved PFC
- Solar inverter
- UPS
- Power Supply

Remarks

By-pass diode = Diode1
FWD = Diode2



MLET

Characteristics

Symbol	Conditions		min.	typ.	max.	Unit
MOSFET 1						
$V_{(BR)DSS}$	V_{GS} = 0 V, I_D = 1 mA, T_j = 25 °C		1200			V
$V_{GS(th)}$	V_{DS} = V_{GS}, I_D = 8.9 mA, T_j = 25 °C		1.6		4	V
I_{DSS}	V_{GS} = 0 V, V_{DS} = 1200 V, T_j = 25 °C				1	mA
I_{GSS}	V_{DS} = 0 V, V_{GS} = 22 V, T_j = 25 °C				100	nA
$R_{DS(on)}$	V_{GS} = 18 V, I_D = 22 A, chiplevel	T_j = 25 °C		45	56	mΩ
		T_j = 150 °C		76		mΩ
C_{iss}	V_{GS} = 0 V, V_{DS} = 800 V, f = 1 MHz			4310		pF
C_{oss}	V_{GS} = 0 V, V_{DS} = 800 V, f = 1 MHz			137		pF
C_{rss}	V_{GS} = 0 V, V_{DS} = 800 V, f = 1 MHz			19		pF
R_{Gint}	T_j = 25 °C			4.7		Ω
Q_G	V_{DS}=600V, V_{GS}=-5V...+20V, I_D = 45 A			215		nC
$t_{d(on)}$	V_{DD} = 600 V, V_{GS} = 20/-5 V, I_D = 45 A, R_{Gon} = 0.5 Ω, R_{Goff} = 0.5 Ω, di/dt_{off} = 2.2 kA/µs, di/dt_{on} = 3.9 kA/µs	T_j = 150 °C		12		ns
$t_{d(off)}$		T_j = 150 °C		64		ns
t_r		T_j = 150 °C		17		ns
t_f		T_j = 150 °C		16		ns
E_{on}		T_j = 150 °C		0.16		mJ
E_{off}		T_j = 150 °C		0.37		mJ
$R_{th(j-s)}$	per MOSFET			1.04		K/W
Integrated body diode						
$V_F = V_{SD}$	$-I_D$ = 22 A, V_{GS} = 0 V, chiplevel	T_j = 25 °C		4.10		V
		T_j = 150 °C		3.90		V
$V_{F0} = V_{SD0}$	chiplevel	T_j = 25 °C		2.60		V
		T_j = 150 °C		2.10		V
$r_F = r_{SD}$	chiplevel	T_j = 25 °C		68		mΩ
		T_j = 150 °C		82		mΩ
t_{rr}	V_{DD} = 600 V, $-I_D$ = 45 A, V_{GS} = -5 V, R_{Gon} = 0.5 Ω	T_j = 150 °C		-		ns
Q_{rr}		T_j = 150 °C		-		µC
I_{rr}		T_j = 150 °C		-		A
E_{rr}		T_j = 150 °C		-		mJ

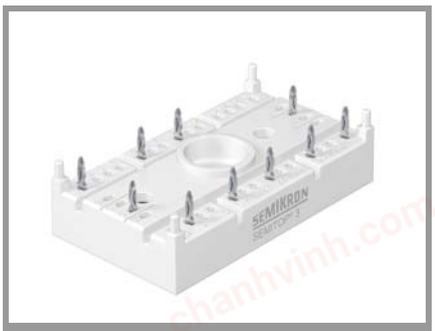
Characteristics

Symbol	Conditions		min.	typ.	max.	Unit
Diode 1						
V_F	I_F = 35 A	T_j = 25 °C		1.20	1.60	V
	chiplevel	T_j = 125 °C		1.19	1.56	V
V_{F0}	chiplevel	T_j = 25 °C		0.88	0.98	V
		T_j = 125 °C		0.73	0.83	V
r_F	chiplevel	T_j = 25 °C		9.2	18	mΩ
		T_j = 125 °C		13	21	mΩ
I_R	T_j = 145 °C, V_{RRM}				1.1	mA
$R_{th(j-s)}$	per Diode, λ_{paste}=0.8 W/(mK)			1.7		K/W

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SK45MLET12SCp



SEMITOP® 3 Press-Fit

SiC MOSFET Module

SK45MLET12SCp

Features*

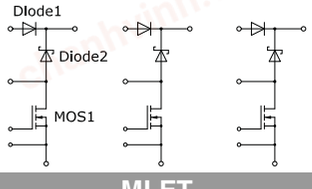
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- SiC 1200V Planar MOSFET
- SiC 1200V Schottky FWD
- By-pass Rectifier diodes
- Extremely high switching frequency
- UL recognized, file no. E63 532

Typical Applications

- Interleaved PFC
- Solar inverter
- UPS
- Power Supply

Remarks

By-pass diode = Diode1
FWD = Diode2



MLET

Characteristics						
Symbol	**Conditions**		**min.**	**typ.**	**max.**	**Unit**
Diode 2						
V_F	I_F = 50 A	T_j = 25 °C		1.40	1.60	V
	chiplevel	T_j = 150 °C		1.80	2.10	V
V_{F0}	chiplevel	T_j = 25 °C		0.95	1.05	V
		T_j = 150 °C		0.80	0.90	V
r_F	chiplevel	T_j = 25 °C		9.0	11	mΩ
		T_j = 150 °C		20	24	mΩ
C_j	V_R = 800 V, f = 1 MHz, T_j = 25 °C			0.210		nF
Q_c	V_R = 800 V, di/dt_{off} = 500 A/µs, T_j = 25 °C			0.088		µC
$R_{th(j-s)}$	per Diode			1.14		K/W

Characteristics					
Symbol	**Conditions**	**min.**	**typ.**	**max.**	**Unit**
Module					
M_s	to heatsink	2.25		2.5	Nm
w	weight		30		g

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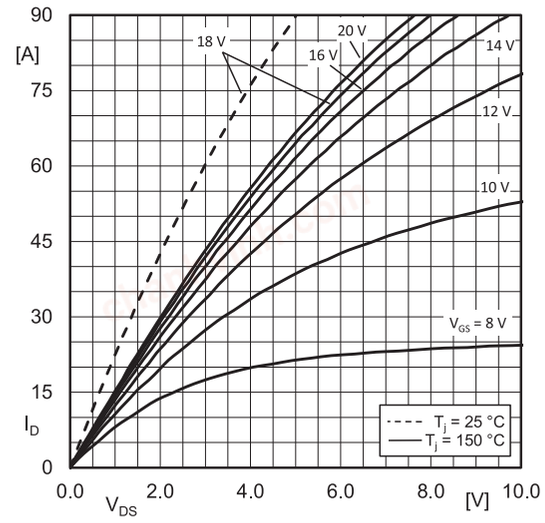


Fig.1: Typ. MOSFET forward output characteristic, incl. $R_{DD'+SS'}$

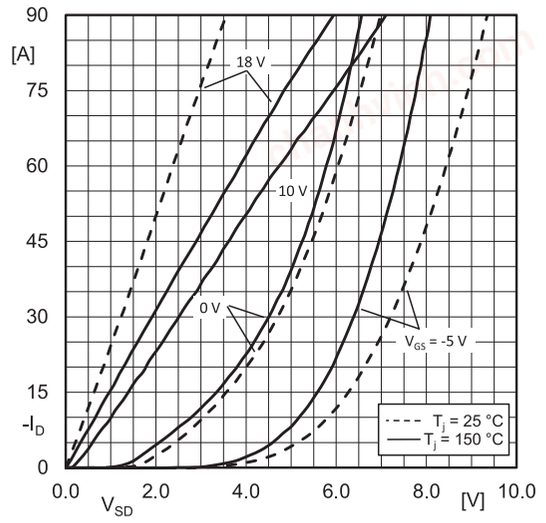


Fig. 2: Typ. reverse output characteristic, incl. $R_{DD'+SS'}$

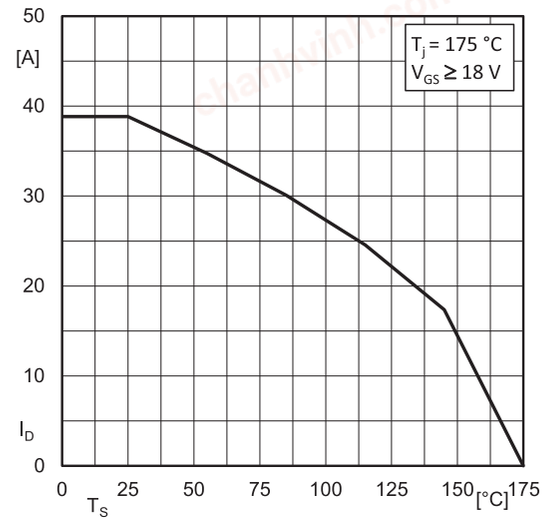


Fig. 3: Rated current vs. temperature $I_D = f(T_S)$

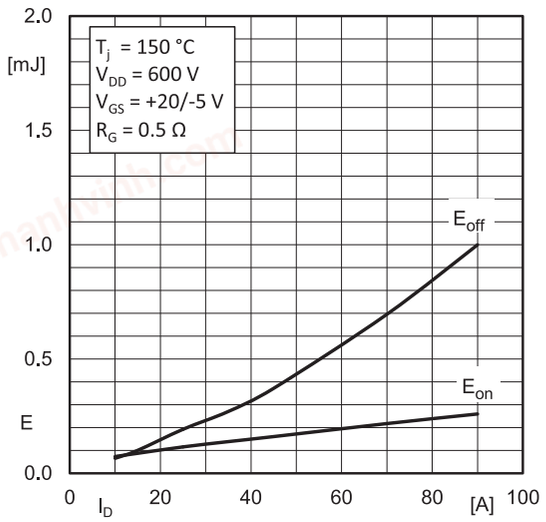


Fig. 4: Typ. turn-on/-off energy $E = f(I_D)$

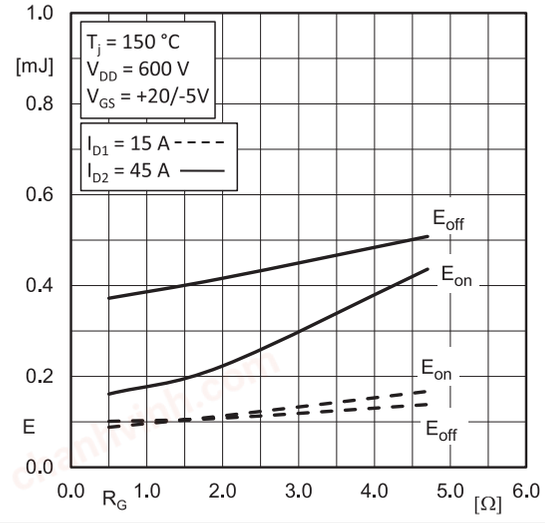


Fig. 5: Typ. turn-on /-off energy E= f (R_G)

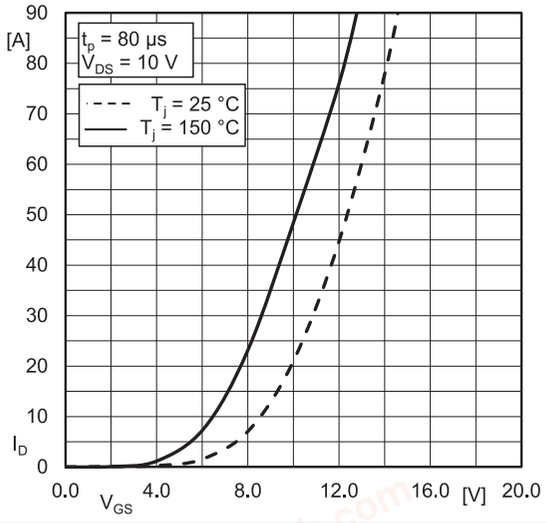


Fig. 6: Typ. MOSFET transfer characteristic

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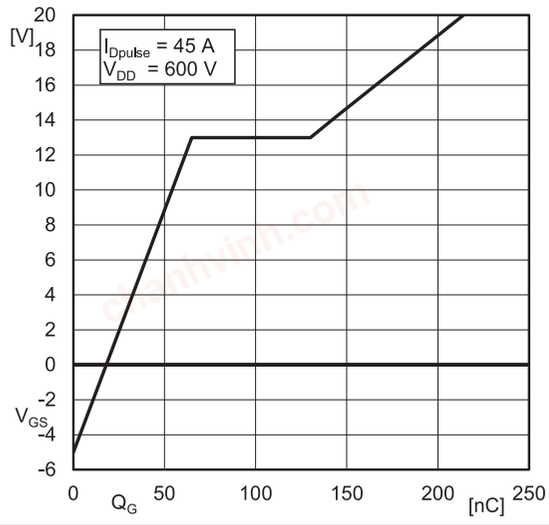


Fig 7: Typ. MOSFET gate charge characteristic

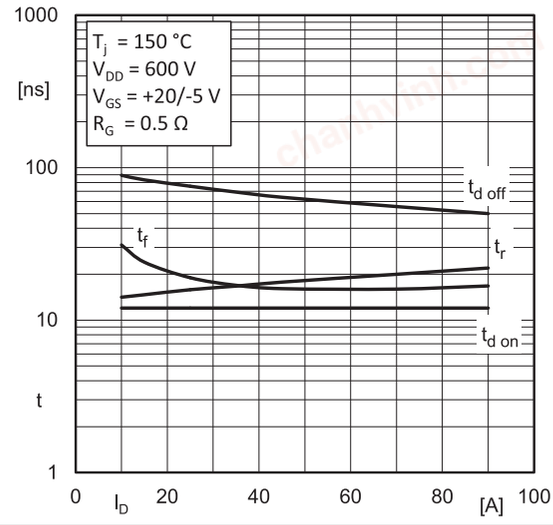


Fig. 8: Typ. switching times vs. I_D

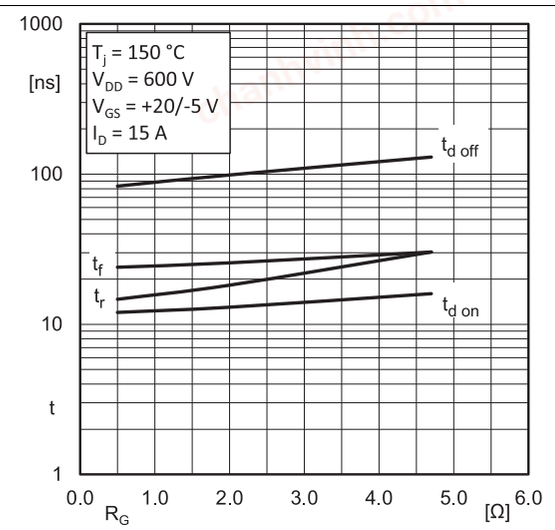


Fig. 9: Typ. switching times vs. gate resistor R_G at I_{D1}

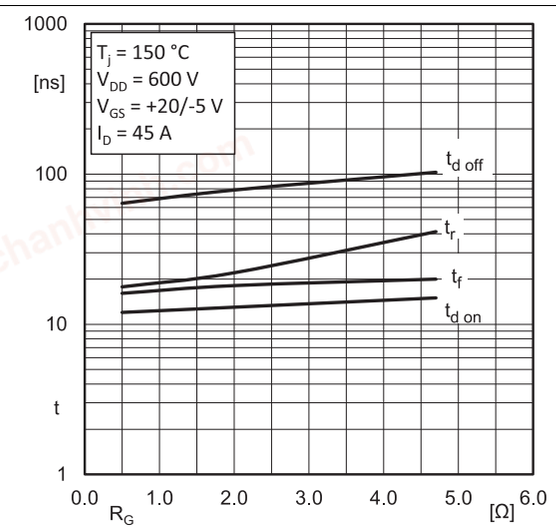


Fig. 10: Typ. switching times vs. gate resistor R_G at I_{D2}

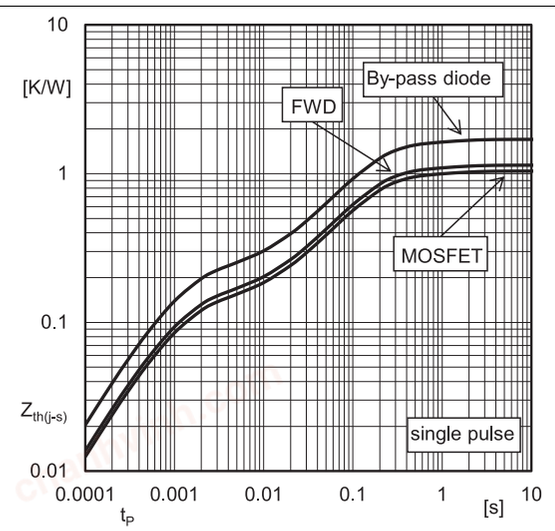


Fig. 11: Typ. transient thermal impedances

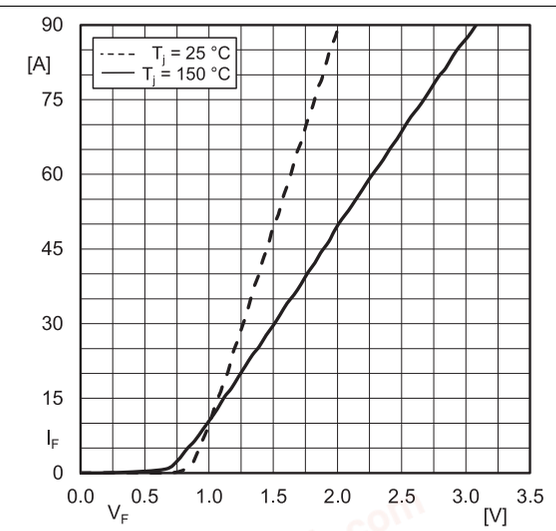


Fig. 12: Typ. FWD output characteristic, incl. $R_{DD'+SS'}$

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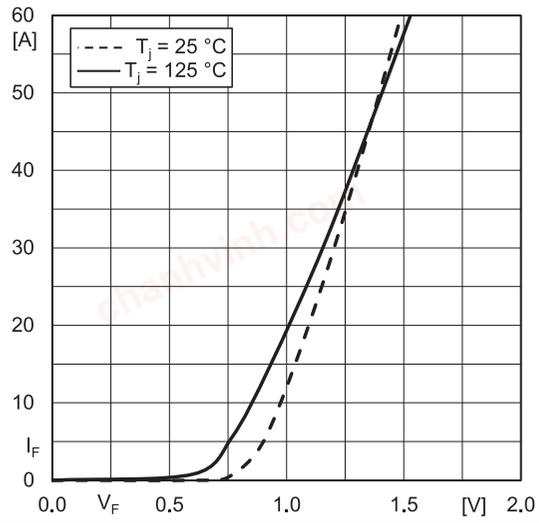


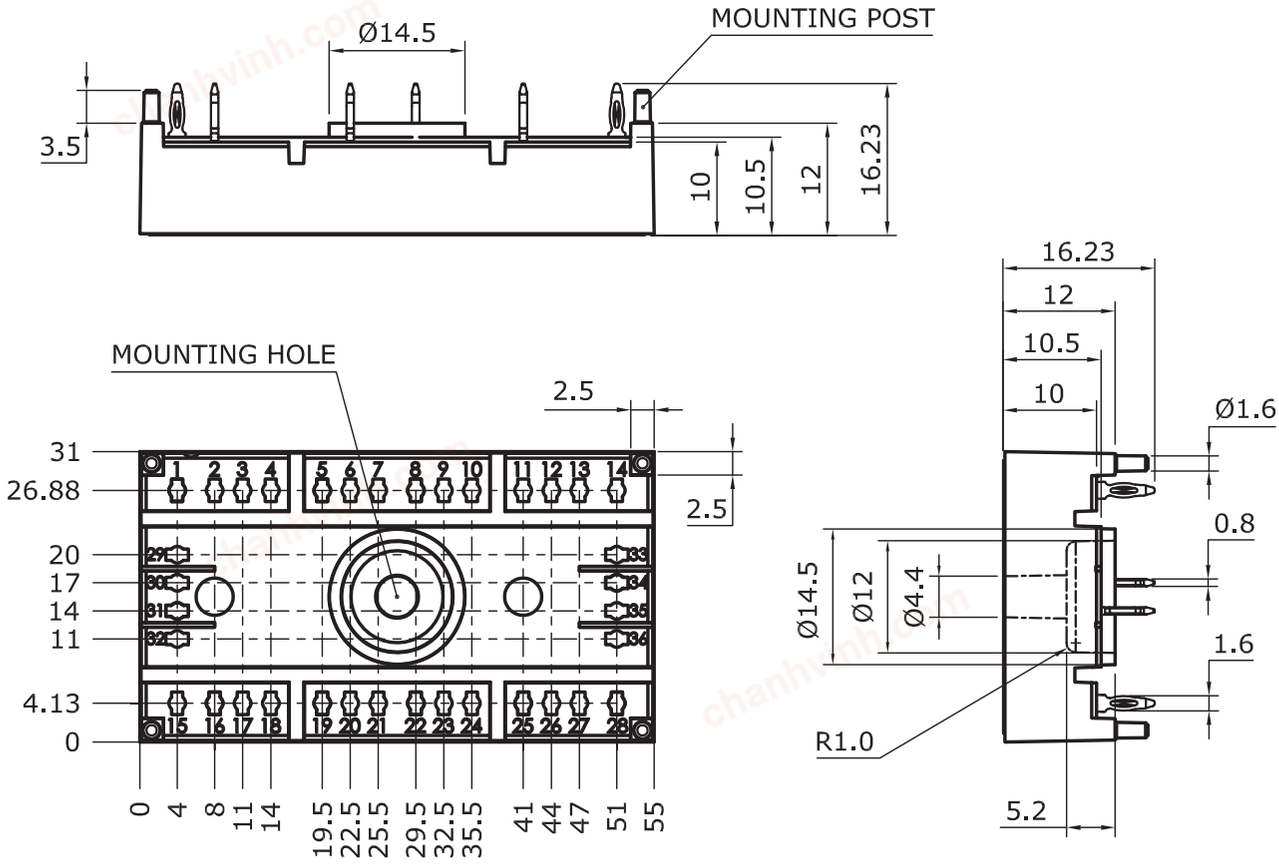
Fig. 13: Typ. by-pass diode output characteristic, inclusive $R_{DD'+SS'}$

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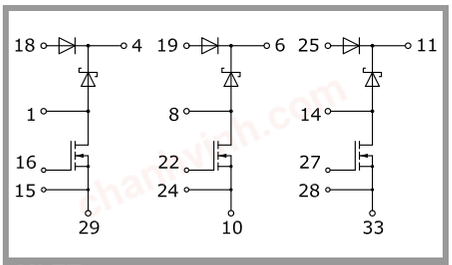
Dimensions: mm
Tolerance system: ISO 2768-m



Suggested drilled hole diameter for terminal pins in the circuit board:
- refer Mounting Instruction SEMITOP® Classic

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SEMITOP 3 Press-Fit



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

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