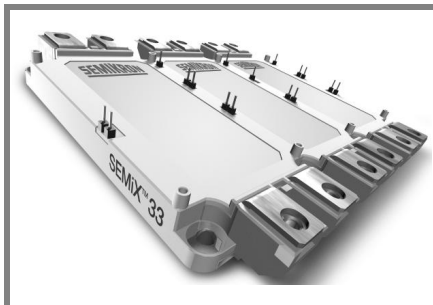


# SEMiX 653GD176HDc



**SEMiX® 33c**

## Trench IGBT Modules

### SEMiX 653GD176HDc

Preliminary Data

#### Features

- Homogeneous Si
- Trench = Trenchgate technology
- $V_{CE(sat)}$  with positive temperature coefficient
- High short circuit capability

#### Typical Applications

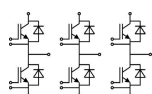
- Matrix Converter
- Resonant Inverter
- Current Source Inverter

#### Remarks

- short circuit capability is tested @  $V_{CC}=1000V$  (all other static parameters are tested @  $V_{CC}=1200V$ )

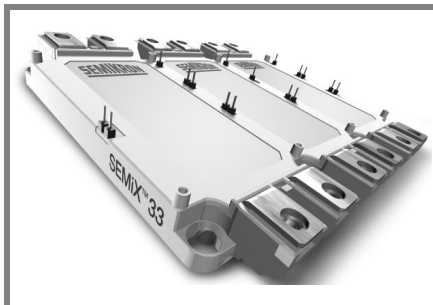
Absolute Maximum Ratings		$T_{case} = 25^{\circ}C$ , unless otherwise specified		
Symbol	Conditions	Values	Units	
<b>IGBT</b>				
$V_{CES}$	$T_j = 25^{\circ}C$	1700	V	
$I_C$	$T_j = 150^{\circ}C$	$T_c = 25^{\circ}C$	620	A
		$T_c = 80^{\circ}C$	435	A
$I_{CRM}$	$I_{CRM} = 2 \times I_{Cnom}$	900	A	
$V_{GES}$		$\pm 20$	V	
$t_{psc}$	$V_{CC} = 1200 V; V_{GE} \leq 20 V; T_j = 125^{\circ}C$ $V_{CES} < 1700 V$	10	$\mu s$	
<b>Inverse Diode</b>				
$I_F$	$T_j = 150^{\circ}C$	$T_c = 25^{\circ}C$	545	A
		$T_c = 80^{\circ}C$	365	A
$I_{FRM}$	$I_{FRM} = 2 \times I_{Fnom}$	900	A	
$I_{FSM}$	$t_p = 10 ms; sin.$	$T_j = 25^{\circ}C$	2900	A
<b>Module</b>				
$I_{t(RMS)}$		600	A	
$T_{vj}$		- 40 ... + 150	$^{\circ}C$	
$T_{stg}$		- 40 ... + 125	$^{\circ}C$	
$V_{isol}$	AC, 1 min.	4000	V	

Characteristics		$T_{case} = 25^{\circ}C$ , unless otherwise specified			
Symbol	Conditions	min.	typ.	max.	Units
<b>IGBT</b>					
$V_{GE(th)}$	$V_{GE} = V_{CE}; I_C = 18 mA$	5,2	5,8	6,4	V
$I_{CES}$	$V_{GE} = 0 V, V_{CE} = V_{CES}$			0,45	mA
$V_{CE0}$		$T_j = 25^{\circ}C$	1	1,2	V
		$T_j = 125^{\circ}C$	0,9	1,1	V
$r_{CE}$	$V_{GE} = 0 V$	$T_j = 25^{\circ}C$	2,2	2,8	m $\Omega$
		$T_j = 125^{\circ}C$	3,4	4	m $\Omega$
$V_{CE(sat)}$	$I_{Cnom} = 450 A, V_{GE} = 15 V$	$T_j = 25^{\circ}C_{chiplev.}$	2	2,45	V
		$T_j = 125^{\circ}C_{chiplev.}$	2,45	2,9	V
$C_{ies}$	$V_{CE} = 25, V_{GE} = 0 V$	$f = 1 MHz$	39,6		nF
$C_{oes}$			1,65		nF
$C_{res}$			1,3		nF
$Q_G$	$V_{GE} = -8 V ... +15 V$		4200		nC
$t_{d(on)}$	$R_{Gon} = 3,6 \Omega$	$V_{CC} = 1200V$ $I_{Cnom} = 450A$	290		ns
$t_r$			90		ns
$E_{on}$	$R_{Goff} = 3,6 \Omega$	$T_j = 125^{\circ}C$	300		mJ
$t_{d(off)}$			975		ns
$t_f$			190		ns
$E_{off}$			180		mJ
$R_{th(j-c)}$	per IGBT			0,054	K/W



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# SEMiX 653GD176HDc



**SEMiX® 33c**

## Trench IGBT Modules

### SEMiX 653GD176HDc

Preliminary Data

#### Features

- Homogeneous Si
- Trench = Trenchgate technology
- $V_{CE(sat)}$  with positive temperature coefficient
- High short circuit capability

#### Typical Applications

- Matrix Converter
- Resonant Inverter
- Current Source Inverter

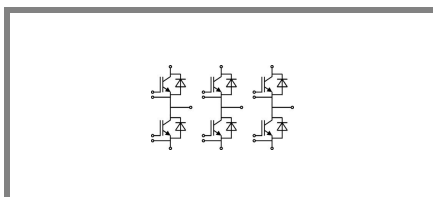
#### Remarks

- short circuit capability is tested @  $V_{CC}=1000V$  (all other static parameters are tested @  $V_{CC}=1200V$ )

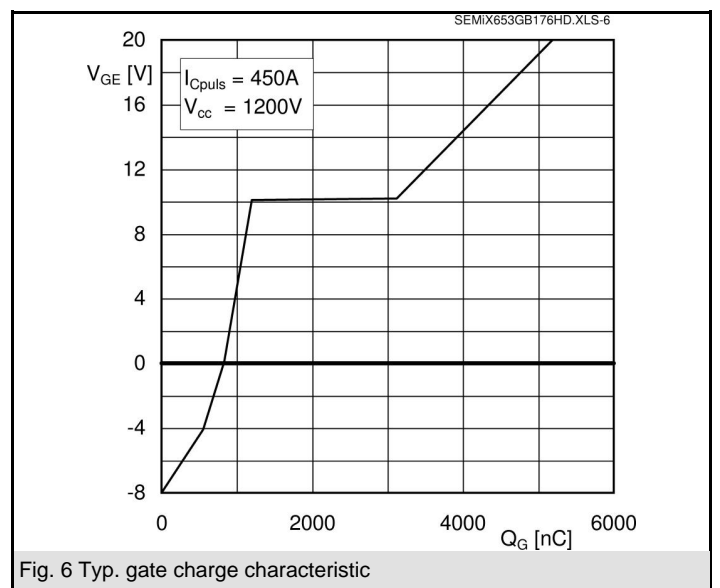
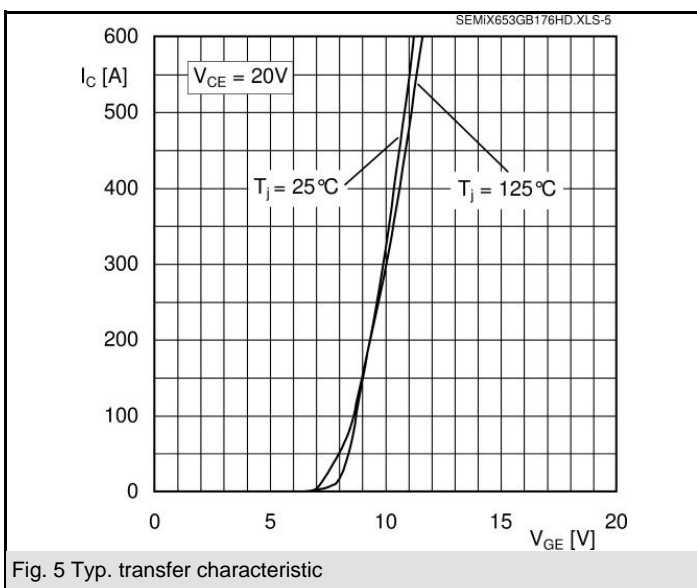
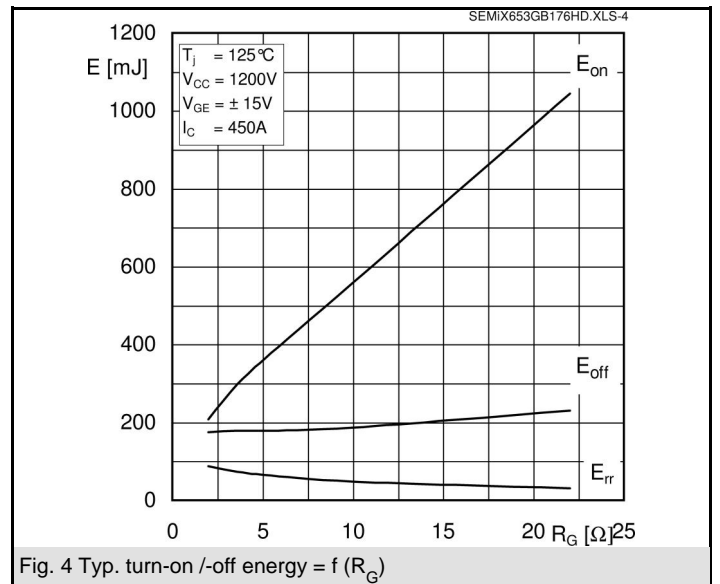
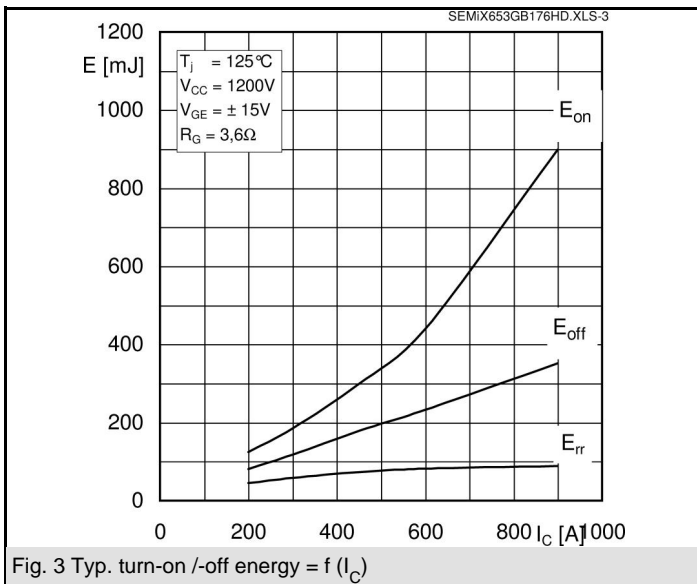
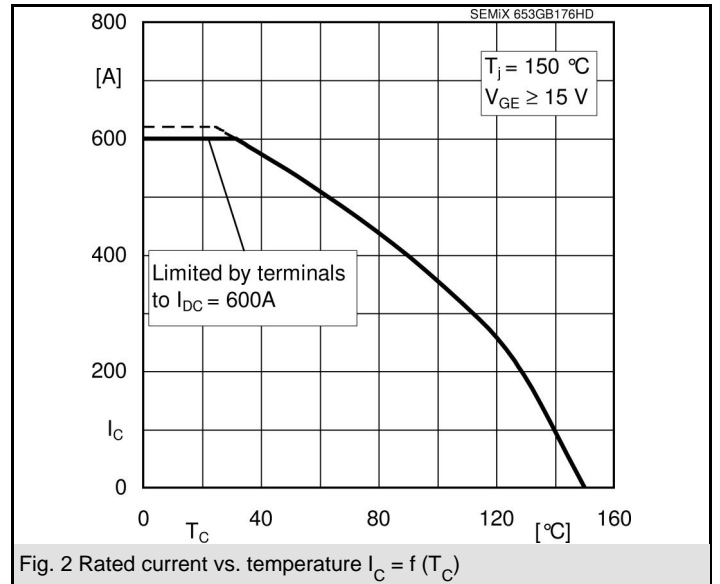
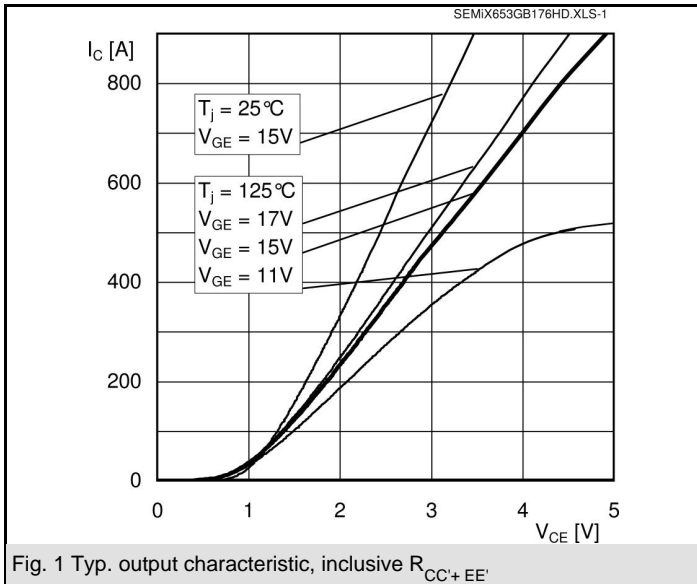
Characteristics		min.	typ.	max.	Units
<b>Inverse Diode</b>					
$V_F = V_{EC}$	$I_{Fnom} = 450 A; V_{GE} = 0 V$		1,7	1,9	V
	$T_j = 25 ^\circ C_{chiplev.}$				
	$T_j = 125 ^\circ C_{chiplev.}$		1,7	1,9	V
$V_{F0}$			1,1	1,3	V
	$T_j = 25 ^\circ C$				
	$T_j = 125 ^\circ C$		0,9	1,1	V
$r_F$			1,3		mΩ
	$T_j = 25 ^\circ C$				
	$T_j = 125 ^\circ C$		1,8		mΩ
$I_{RRM}$	$I_{Fnom} = 450 A$		380		A
$Q_{rr}$	$di/dt = 4200 A/\mu s$		130		μC
$E_{rr}$	$V_{GE} = -15 V; V_{CC} = 1200 V$		73		mJ
$R_{th(j-c)D}$	per diode			0,11	K/W
<b>Module</b>					
$L_{CE}$			20		nH
$R_{CC'+EE'}$	res., terminal-chip	$T_{case} = 25 ^\circ C$	0,7		mΩ
		$T_{case} = 125 ^\circ C$	1		mΩ
$R_{th(c-s)}$	per module		0,014		K/W
$M_s$	to heat sink M5		3	5	Nm
$M_t$	to terminals M6		2,5	5	Nm
w				900	g
<b>Temperature sensor</b>					
$R_{100}$	$T_c = 100^\circ C (R_{25} = 5 k\Omega)$		0,493±5%		kΩ
$B_{100/125}$	$R(T) = R_{100} \exp[B_{100/125} (1/T - 1/T_{100})]$ ; $T[K]; B$		3550±2%		K

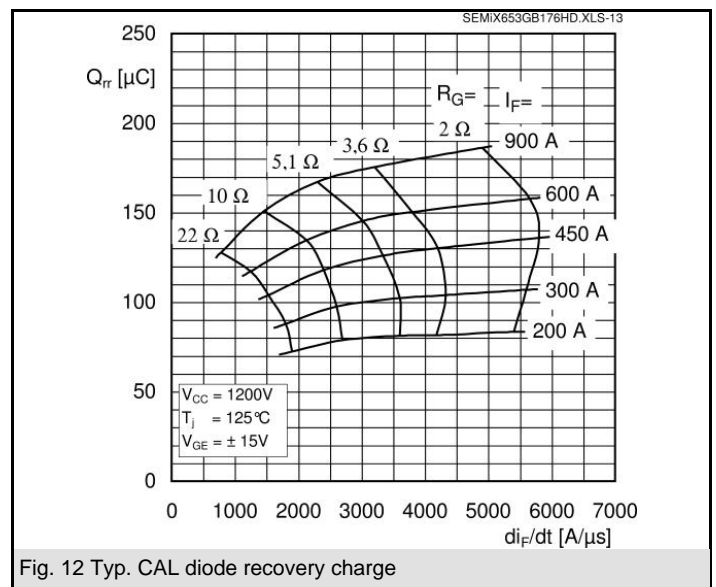
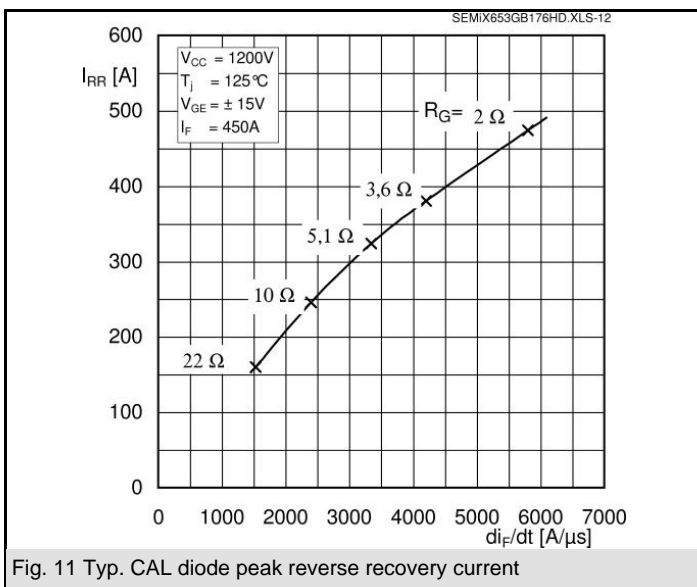
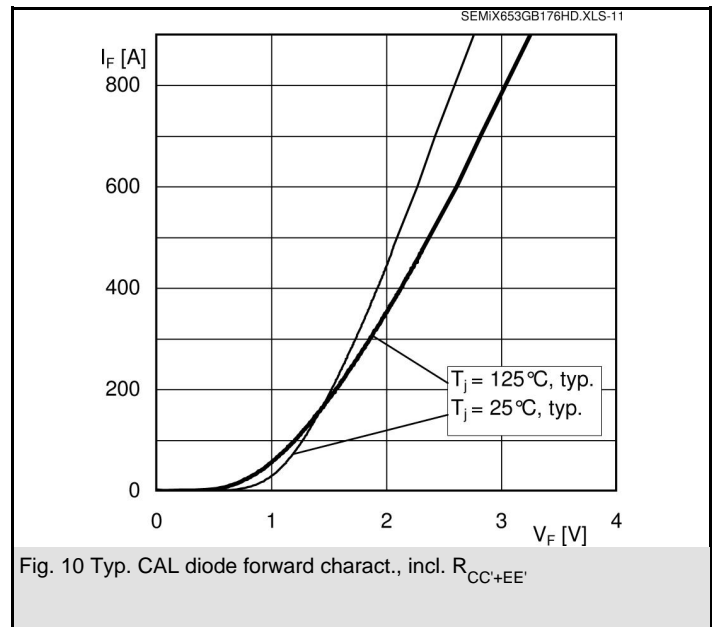
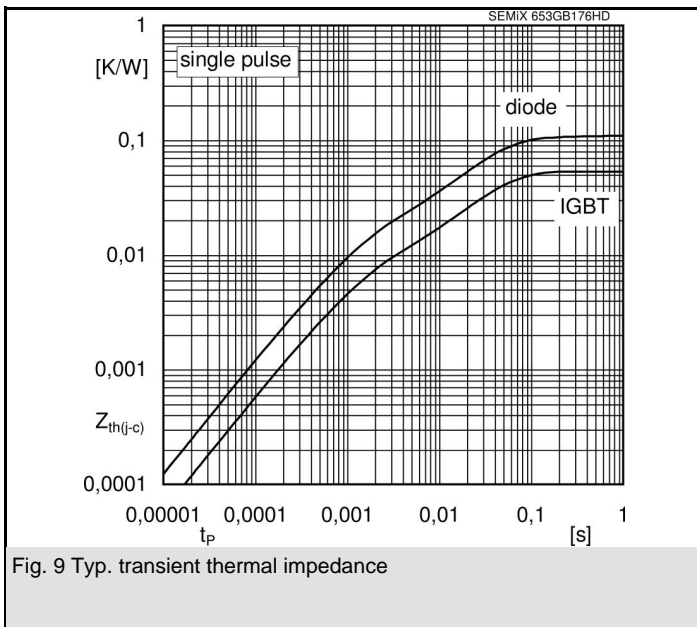
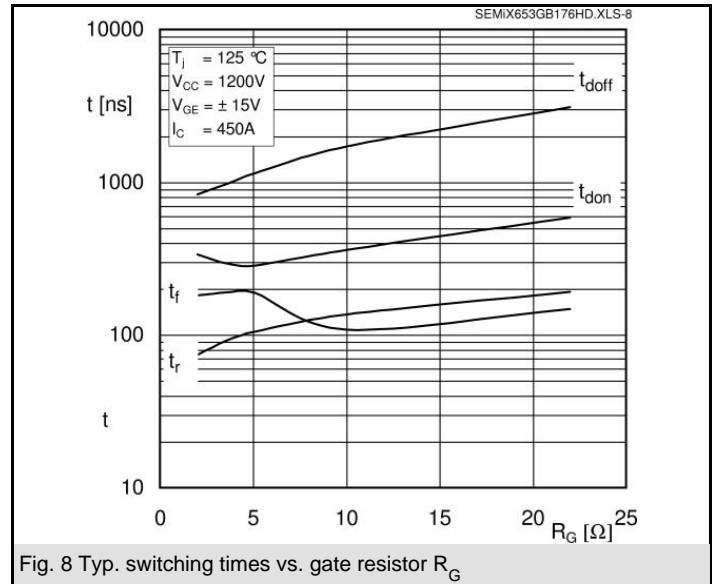
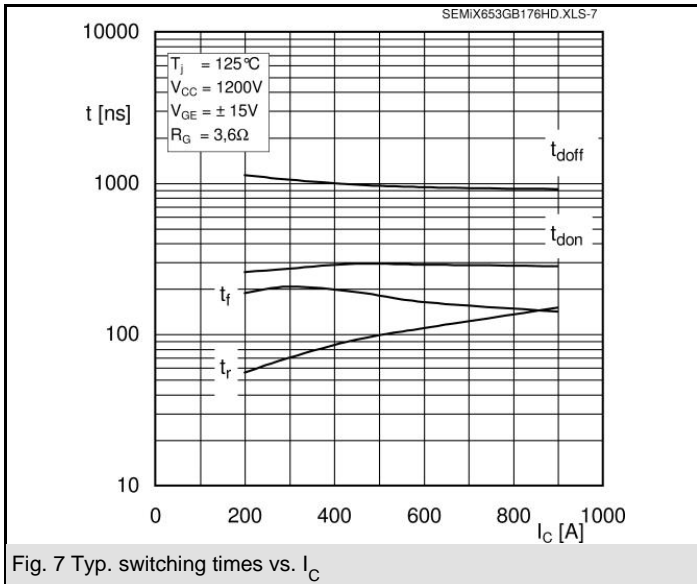
This is an electrostatic discharge sensitive device (ESDS), international standard IEC 60747-1, Chapter IX.

This technical information specifies semiconductor devices but promises no characteristics. No warranty or guarantee expressed or implied is made regarding delivery, performance or suitability.

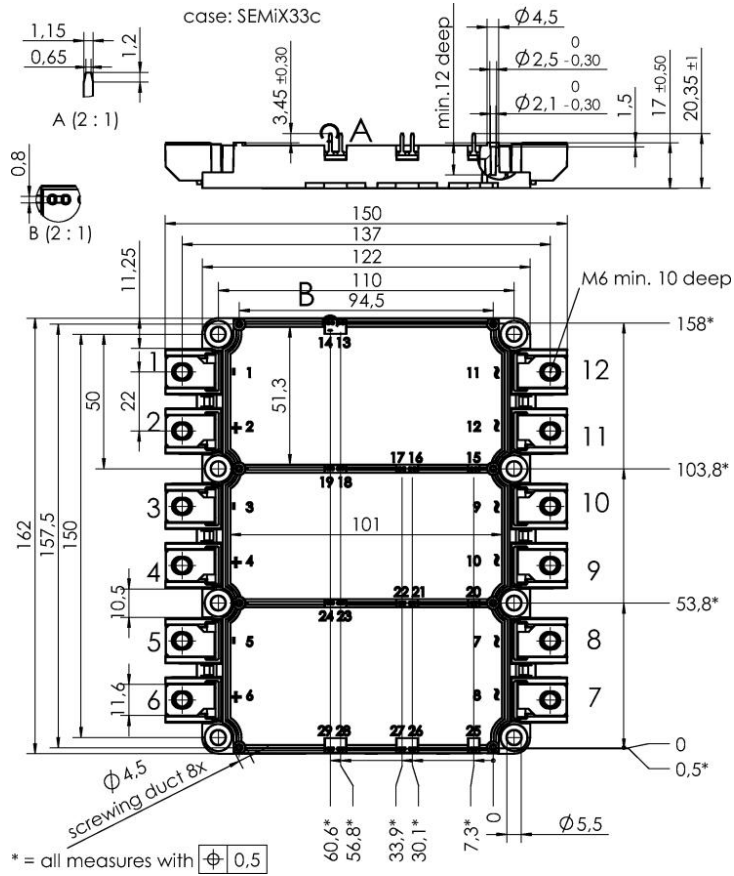


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# SEMiX 653GD176HDc



Case SEMiX 33c

