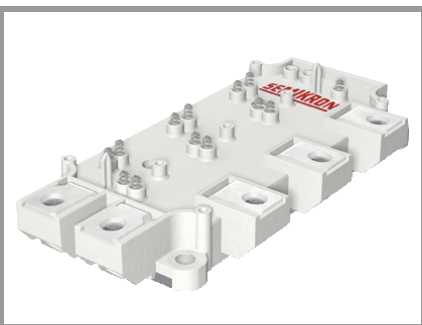


# SEMiX101GD128Ds



SEMiX<sup>®</sup>13

## SPT IGBT Modules

SEMiX101GD128Ds

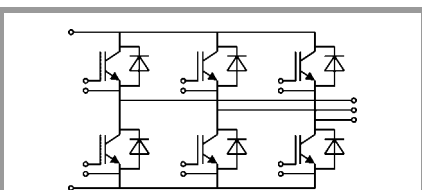
Preliminary Data

### Features

- Homogeneous Si
- SPT = Soft-Punch-Through technology
- $V_{CE(sat)}$  with positive temperature coefficient
- High short circuit capability
- UL recognised file no. E63532

### Typical Applications

- AC inverter drives
- UPS
- Electronic welders up to 20 kHz

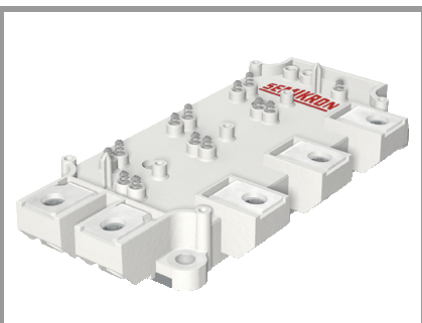


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Absolute Maximum Ratings				
Symbol	Conditions	Values	Unit	
<b>IGBT</b>				
$V_{CES}$		1200	V	
$I_C$	$T_j = 150\text{ °C}$	$T_c = 25\text{ °C}$	104	A
		$T_c = 80\text{ °C}$	74	A
$I_{Cnom}$		50	A	
$I_{CRM}$	$I_{CRM} = 2 \times I_{Cnom}$	100	A	
$V_{GES}$		-20 ... 20	V	
$t_{psc}$	$V_{CC} = 600\text{ V}$	10	$\mu\text{s}$	
	$V_{GE} \leq 20\text{ V}$			
	$T_j = 125\text{ °C}$			
	$V_{CES} \leq 1200\text{ V}$			
$T_j$		-40 ... 150	$^{\circ}\text{C}$	
<b>Inverse diode</b>				
$I_F$	$T_j = 150\text{ °C}$	$T_c = 25\text{ °C}$	88	A
		$T_c = 80\text{ °C}$	61	A
$I_{Fnom}$		50	A	
$I_{FRM}$	$I_{FRM} = 2 \times I_{Fnom}$	100	A	
$I_{FSM}$	$t_p = 10\text{ ms, sin } 180^{\circ}, T_j = 25\text{ °C}$	550	A	
$T_j$		-40 ... 150	$^{\circ}\text{C}$	
<b>Module</b>				
$I_{t(RMS)}$		600	A	
$T_{stg}$		-40 ... 125	$^{\circ}\text{C}$	
$V_{isol}$	AC sinus 50Hz, $t = 1\text{ min}$	4000	V	

Characteristics					
Symbol	Conditions	min.	typ.	max.	Unit
<b>IGBT</b>					
$V_{CE(sat)}$	$I_C = 50\text{ A}$ $V_{GE} = 15\text{ V}$ chipelevel	$T_j = 25\text{ °C}$	1.9	2.35	V
		$T_j = 125\text{ °C}$	2.10	2.55	V
$V_{CE0}$		$T_j = 25\text{ °C}$	1	1.15	V
		$T_j = 125\text{ °C}$	0.9	1.05	V
$r_{CE}$	$V_{GE} = 15\text{ V}$	$T_j = 25\text{ °C}$	18.0	24.0	$\text{m}\Omega$
		$T_j = 125\text{ °C}$	24.0	30.0	$\text{m}\Omega$
$V_{GE(th)}$	$V_{GE} = V_{CE}, I_C = 2\text{ mA}$	4.5	5	6.5	V
$I_{CES}$	$V_{GE} = 0\text{ V}$ $V_{CE} = 1200\text{ V}$	$T_j = 25\text{ °C}$	0.1	0.3	mA
		$T_j = 125\text{ °C}$			mA
$C_{ies}$	$V_{CE} = 25\text{ V}$ $V_{GE} = 0\text{ V}$	$f = 1\text{ MHz}$	4.7		nF
$C_{oes}$		$f = 1\text{ MHz}$	0.29		nF
$C_{res}$		$f = 1\text{ MHz}$	0.19		nF
$Q_G$	$V_{GE} = -8\text{ V...} + 15\text{ V}$		480		nC
$R_{Gint}$	$T_j = 25\text{ °C}$		5.00		$\Omega$
$t_{d(on)}$	$V_{CC} = 600\text{ V}$		115		ns
$t_r$	$I_C = 50\text{ A}$		30		ns
$E_{on}$	$T_j = 125\text{ °C}$		5.2		mJ
$t_{d(off)}$	$R_{G on} = 8\text{ }\Omega$		340		ns
$t_f$	$R_{G off} = 8\text{ }\Omega$		55		ns
$E_{off}$			5.5		mJ
$R_{th(j-c)}$	per IGBT			0.28	K/W
$R_{th(j-s)}$	per IGBT				K/W

# SEMiX101GD128Ds



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## SPT IGBT Modules

SEMiX101GD128Ds

Preliminary Data

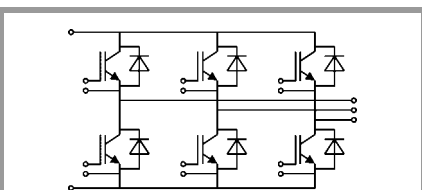
### Features

- Homogeneous Si
- SPT = Soft-Punch-Through technology
- $V_{CE(sat)}$  with positive temperature coefficient
- High short circuit capability
- UL recognised file no. E63532

### Typical Applications

- AC inverter drives
- UPS
- Electronic welders up to 20 kHz

Characteristics						
Symbol	Conditions		min.	typ.	max.	Unit
<b>Inverse diode</b>						
$V_F = V_{EC}$	$I_F = 50\text{ A}$ $V_{GE} = 0\text{ V}$ chipelevel	$T_j = 25\text{ °C}$		2.0	2.5	V
		$T_j = 125\text{ °C}$		1.8	2.3	V
$V_{F0}$		$T_j = 25\text{ °C}$	0.75	1.1	1.45	V
		$T_j = 125\text{ °C}$	0.5	0.85	1.2	V
$r_F$		$T_j = 25\text{ °C}$	15.0	18.0	21.0	mΩ
		$T_j = 125\text{ °C}$	16.0	19.0	22.0	mΩ
$I_{RRM}$	$I_F = 50\text{ A}$	$T_j = 125\text{ °C}$		77		A
$Q_{rr}$	$di/dt_{off} = 2840\text{ A}/\mu\text{s}$ $V_{GE} = -15\text{ V}$	$T_j = 125\text{ °C}$		7.8		μC
$E_{rr}$	$V_{CC} = 600\text{ V}$	$T_j = 125\text{ °C}$		2.9		mJ
$R_{th(j-c)}$	per diode				0.46	K/W
$R_{th(j-s)}$	per diode					K/W
<b>Module</b>						
$L_{CE}$				20		nH
$R_{CC'+EE'}$	res., terminal-chip	$T_C = 25\text{ °C}$		0.7		mΩ
		$T_C = 125\text{ °C}$		1		mΩ
$R_{th(c-s)}$	per module			0.04		K/W
$M_s$	to heat sink (M5)		3		5	Nm
$M_t$		to terminals (M6)	2.5		5	Nm
						Nm
$w$					350	g
<b>Temperature sensor</b>						
$R_{100}$	$T_C = 100\text{ °C}$ ( $R_{25} = 5\text{ k}\Omega$ )			0,493 ±5%		kΩ
$B_{100/125}$	$R_{(T)} = R_{100} \exp[B_{100/125}(1/T - 1/T_{100})]$ ; $T[\text{K}]$ ;			3550 ±2%		K



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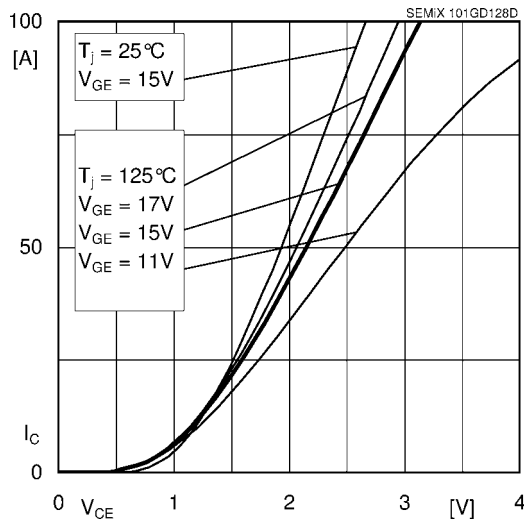


Fig. 1 Typ. output characteristic, inclusive  $R_{CC'+EE'}$

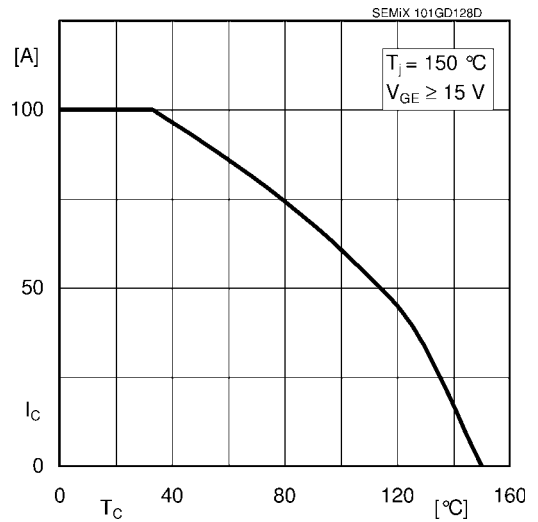


Fig. 2 Rated current vs. temperature  $I_C = f(T_C)$

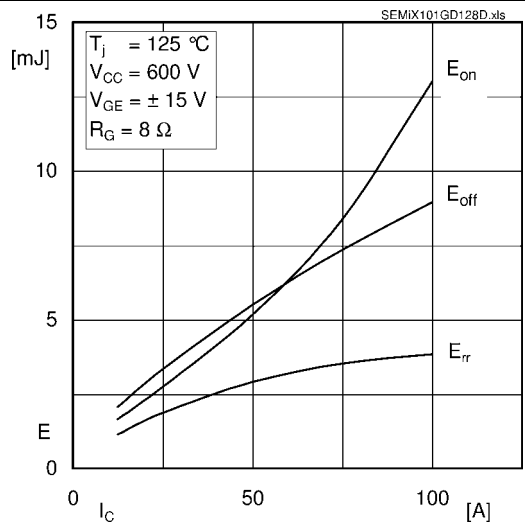


Fig. 3 Typ. turn-on /-off energy =  $f(I_C)$

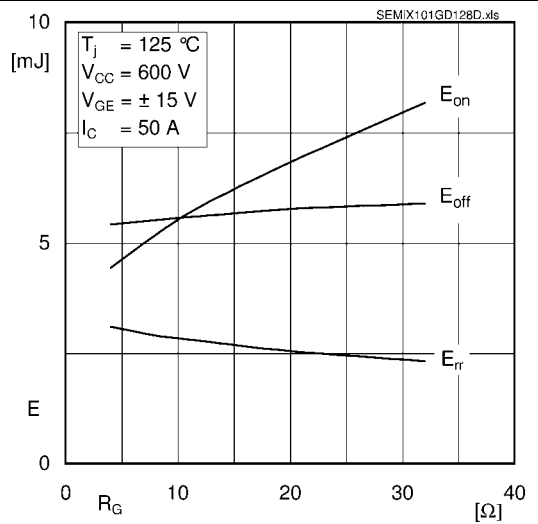


Fig. 4 Typ. turn-on /-off energy =  $f(R_G)$

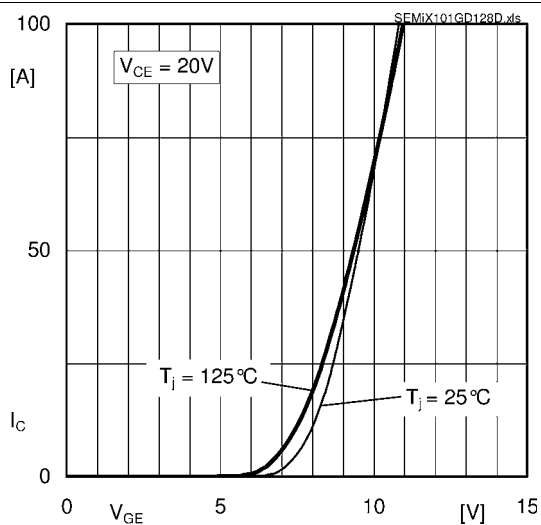


Fig. 5 Typ. transfer characteristic

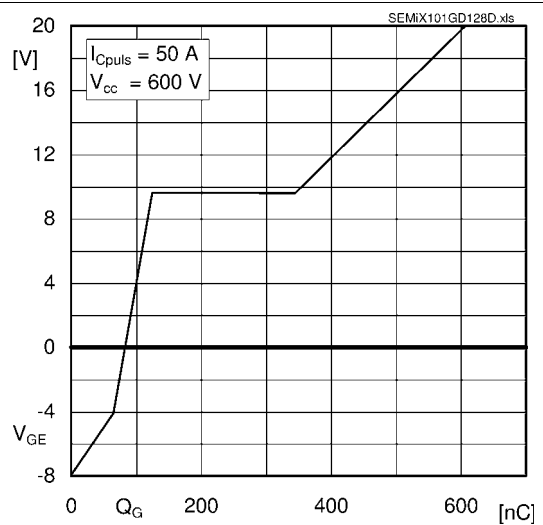


Fig. 6 Typ. gate charge characteristic

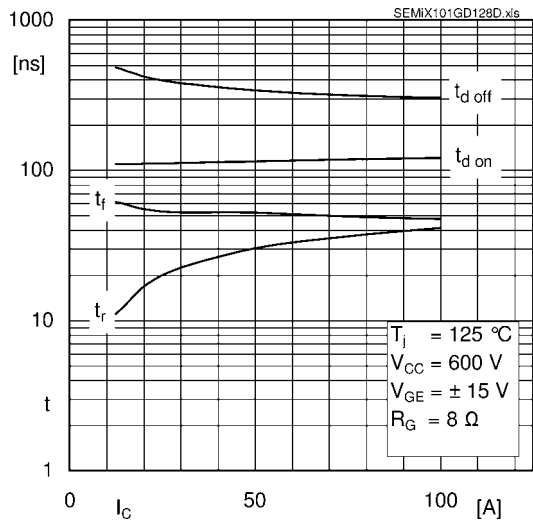


Fig. 7 Typ. switching times vs.  $I_C$

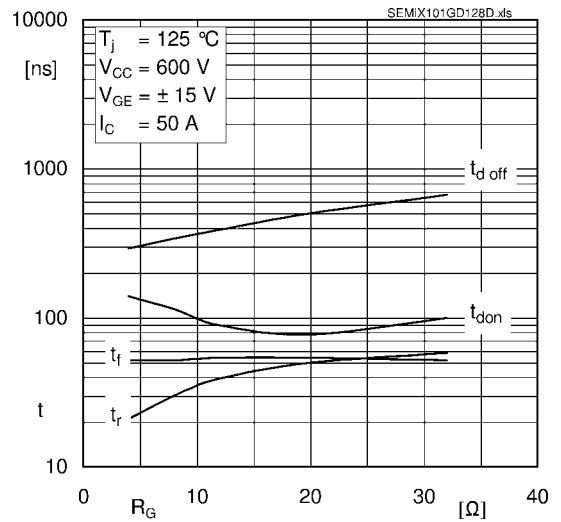


Fig. 8 Typ. switching times vs. gate resistor  $R_G$

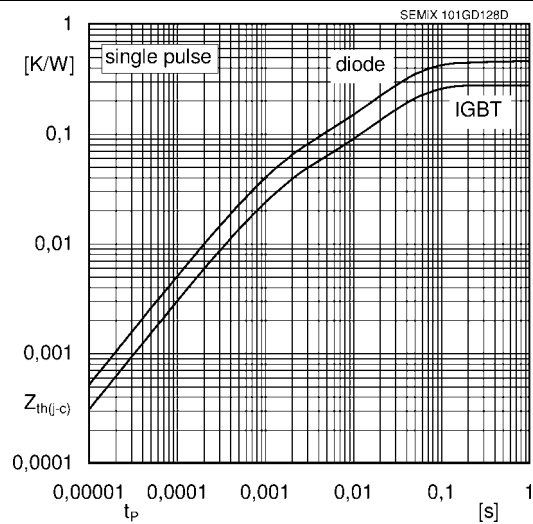


Fig. 9 Typ. transient thermal impedance

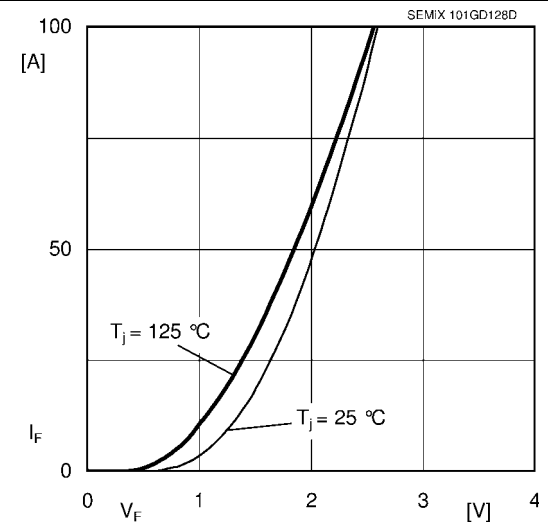


Fig. 10 Typ. CAL diode forward charact., incl.  $R_{CC'+EE'}$

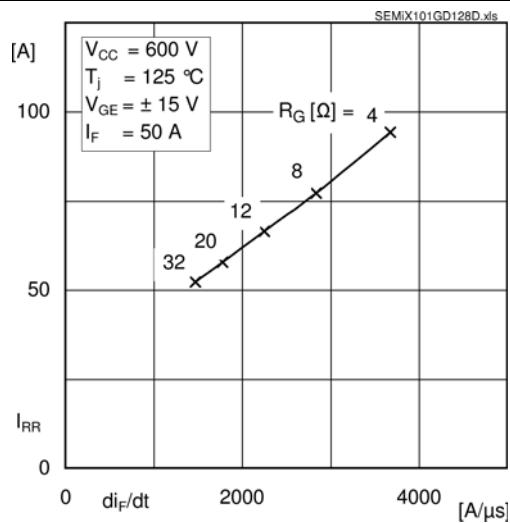


Fig. 11 Typ. CAL diode peak reverse recovery current

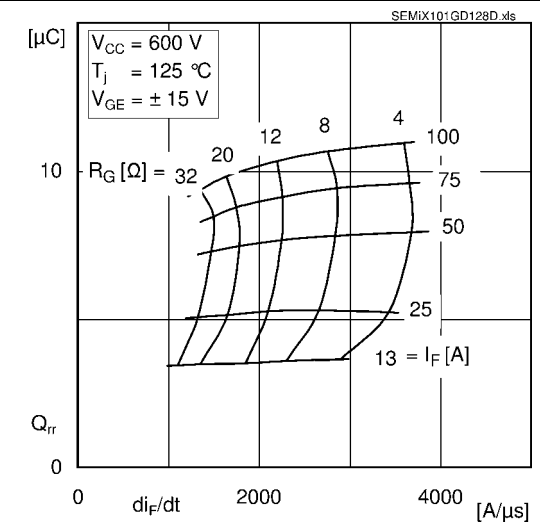
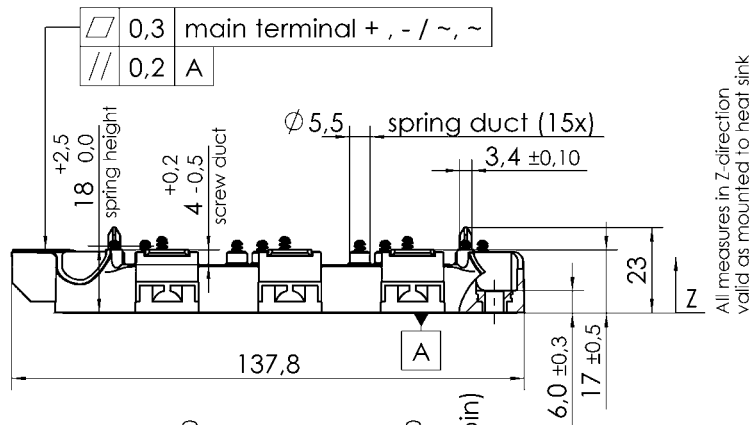
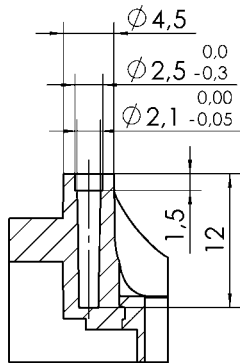


Fig. 12 Typ. CAL diode recovery charge

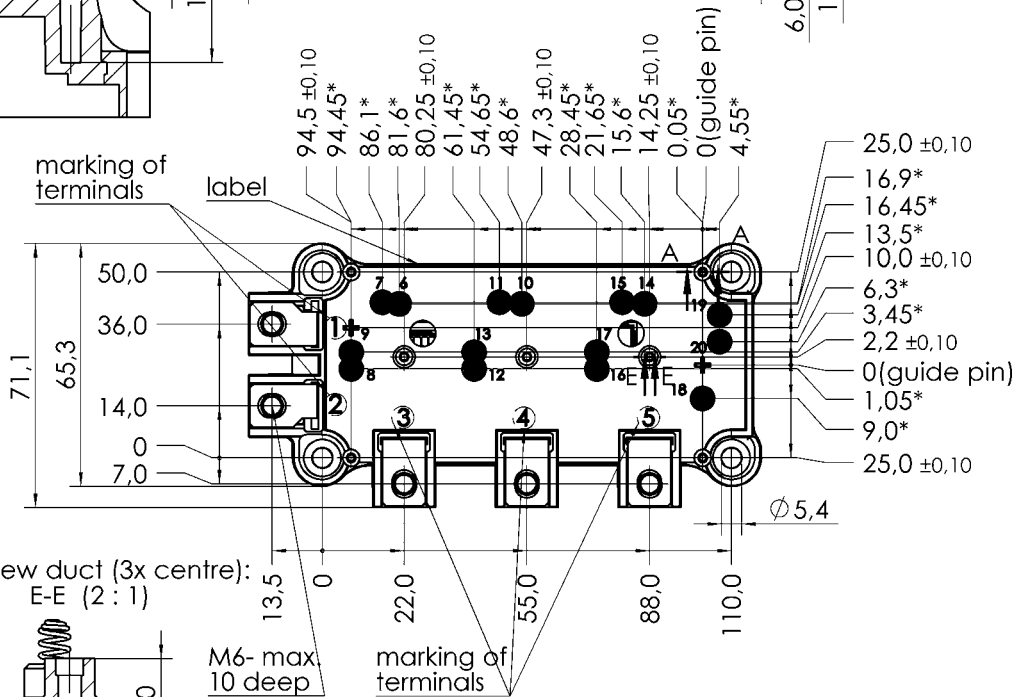
# SEMiX101GD128Ds

case: SEMiX 13

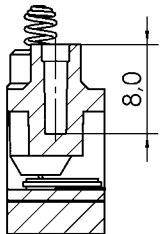
screw duct (4x):  
A-A (2:1)



All measures in Z-direction  
valid as mounted to heat sink



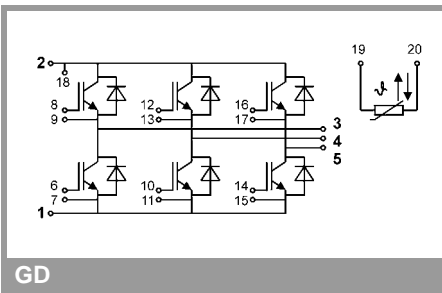
screw duct (3x centre):  
E-E (2:1)



\* all measures with  $\pm 0,2$

Rules for the contact PCB:  
- spring landing pad =  $\varnothing 3,5 \pm 0,2$   
- holes guidepins =  $\varnothing 4 \pm 0,1$

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

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