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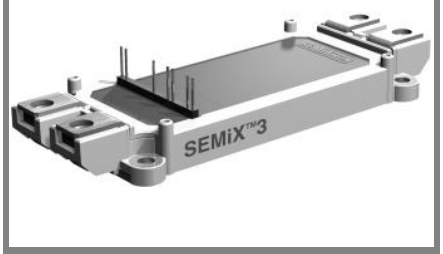


SEMiX® 3

SPT IGBT Modules

SEMiX 403GB128D

Preliminary Data

Features

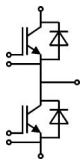
- Homogeneous Si
- SPT = Soft-Punch-Through technology
- $V_{CE(sat)}$ with positive temperature coefficient
- High short circuit capability

Typical Applications

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

Remarks

- Not for new design



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Absolute Maximum Ratings			T_{case} = 25°C, unless otherwise specified	
Symbol	**Conditions**		**Values**	**Units**
IGBT				
V_{CES}	T_j = 25 °C		1200	V
I_C	T_j = 150 °C	T_{case} = 25 °C	420	A
		T_{case} = 80 °C	300	A
I_{CRM}	I_{CRM}=2xI_{Cnom}		450	A
V_{GES}			±20	V
t_{psc}	V_{CC} = 600 V; V_{GE} ≤ 20 V; VCES < 1200 V	T_j = 125 °C	10	µs
Inverse Diode				
I_F	T_j = 150 °C	T_{case} = 25 °C	340	A
		T_{case} = 80 °C	235	A
I_{FRM}	I_{FRM}=2xI_{Fnom}		450	A
I_{FSM}	t_p = 10 ms; sin.	T_j = 25 °C	2000	A
Module				
$I_{t(RMS)}$			600	A
T_{vj}			-40 ... + 150	°C
T_{stg}			-40 ... + 125	°C
V_{isol}	AC, 1 min.		4000	V

Characteristics					T_{case} = 25°C, unless otherwise specified	
Symbol	**Conditions**		**min.**	**typ.**	**max.**	**Units**
IGBT						
$V_{GE(th)}$	V_{GE} = V_{CE}, I_C = 9 mA		4,5	5	6,5	V
I_{CES}	V_{GE} = 0 V, V_{CE} = V_{CES}	T_j = 25 °C			0,3	mA
V_{CE0}		T_j = 25 °C		1	1,15	V
		T_j = 125 °C		0,9	1,05	V
r_{CE}	V_{GE} = 15 V	T_j = 25°C		4	5,3	mΩ
		T_j = 125°C		5,3	6,7	mΩ
$V_{CE(sat)}$	I_{Cnom} = 225 A, V_{GE} = 15 V	T_j = 25°$C_{chiplev.}$		1,9	2,35	V
		T_j = 125°$C_{chiplev.}$		2,1	2,55	V
C_{ies}	V_{CE} = 25, V_{GE} = 0 V	f = 1 MHz		20,8		nF
C_{oes}				1,4		nF
C_{res}				0,9		nF
Q_G	V_{GE} = -8 V ... +15 V			2150		nC
$t_{d(on)}$	R_{Gon} = 4 Ω	V_{CC} = 600V		145		ns
t_r		I_{Cnom}= 225A		60		ns
E_{on}		T_j = 125 °C		20		mJ
$t_{d(off)}$	R_{Goff} = 4 Ω			575		ns
t_f				70		ns
E_{off}				23		mJ
$R_{th(j-c)}$	per IGBT				0,075	K/W

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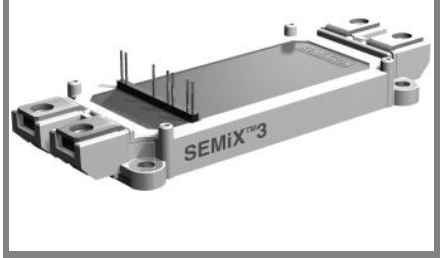

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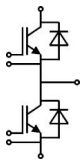

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Characteristics						
Symbol	**Conditions**		**min.**	**typ.**	**max.**	**Units**
Inverse Diode						
$V_F = V_{EC}$	I_{Fnom} = 225 A; V_{GE} = 0 V	T_j = 25 °C$_{chiplev.}$		2	2,5	V
		T_j = 125 °C$_{chiplev.}$		1,8	2,3	V
V_{F0}		T_j = 25 °C		1,1	1,45	V
		T_j = 125 °C		0,85	1,2	V
r_F		T_j = 25 °C		4	4,7	mΩ
		T_j = 125 °C		4,2	4,9	mΩ
I_{RRM}	I_{Fnom} = 225 A	T_j = 125 °C		260		A
Q_{rr}	di/dt = 4950 A/µs			29		µC
E_{rr}	V_{GE} = -15 V; V_{CC} = 600 V			10		mJ
$R_{th(j-c)D}$	per diode				0,13	K/W
Module						
L_{CE}				20		nH
$R_{CC'+EE'}$	res., terminal-chip	T_{case}= 25 °C		0,7		mΩ
		T_{case}= 125 °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
w					300	g
Temperature sensor						
R_{100}	T_c=100°C (R_{25}=5 kΩ)			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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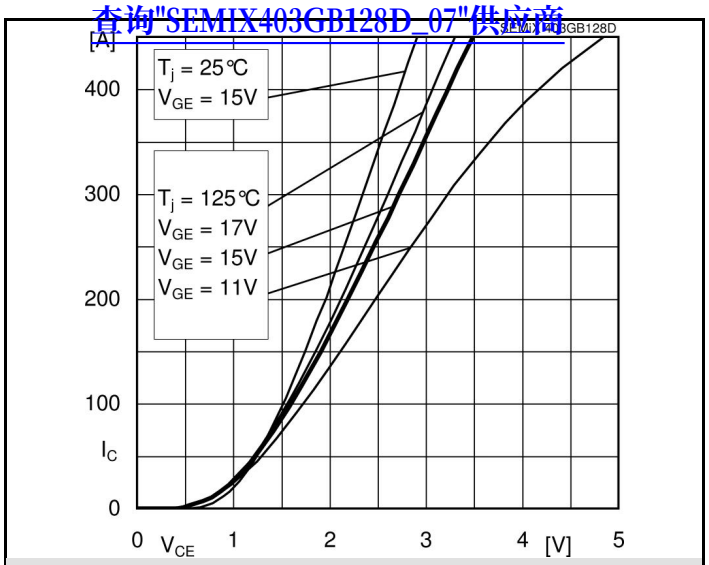

Fig. 1 Typ. output characteristic, inclusive $R_{CC'+EE'}$

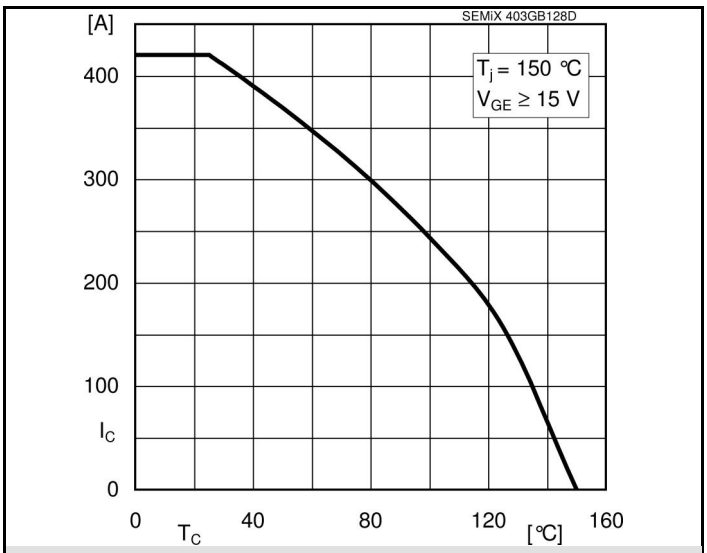

Fig. 2 Rated current vs. temperature $I_C = f(T_C)$

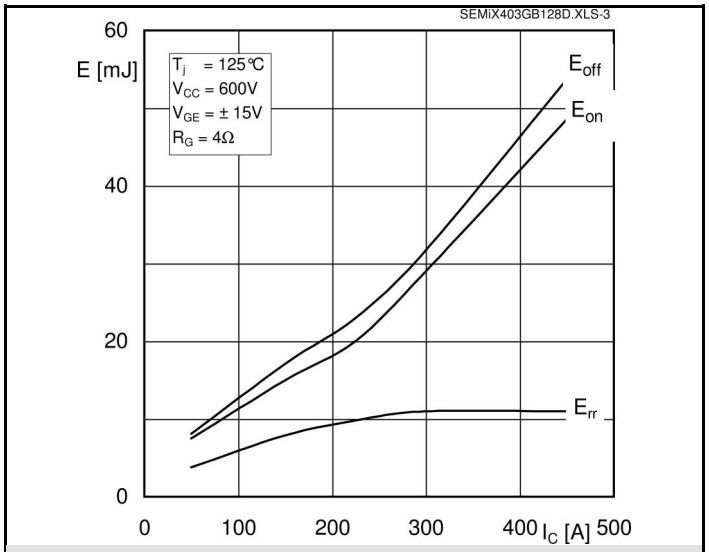

Fig. 3 Typ. turn-on /-off energy = f (I_C)

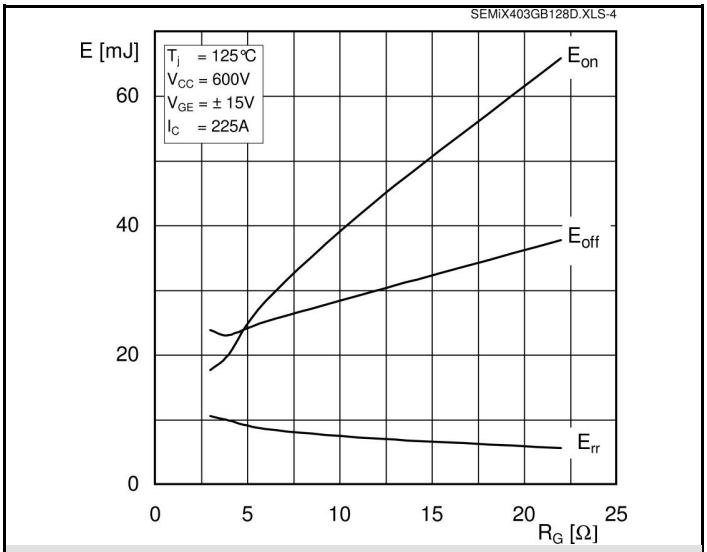

Fig. 4 Typ. turn-on /-off energy = f (R_G)

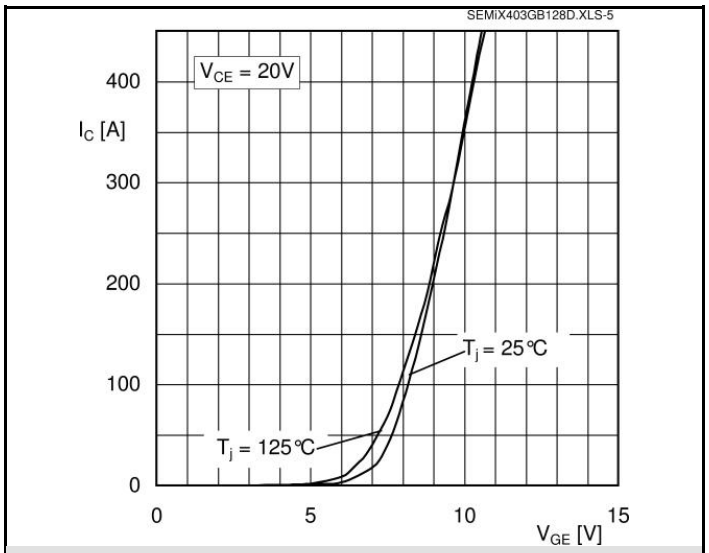

Fig. 5 Typ. transfer characteristic

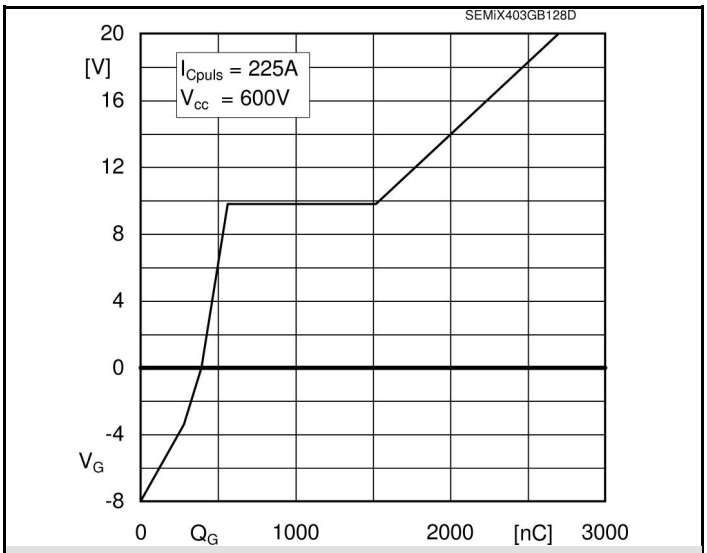

Fig. 6 Typ. gate charge characteristic

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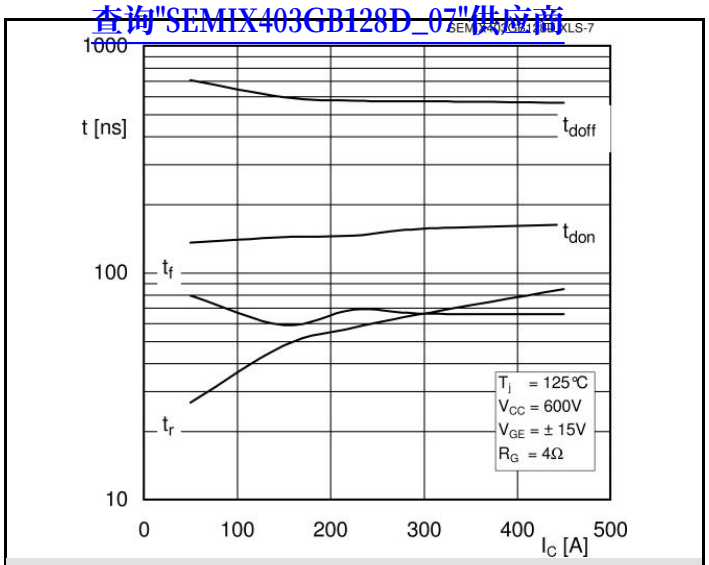

Fig. 7 Typ. switching times vs. I_C

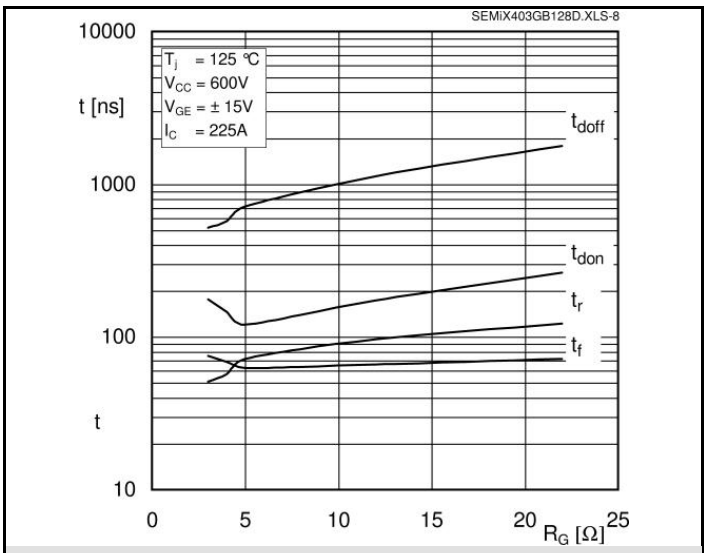

Fig. 8 Typ. switching times vs. gate resistor R_G

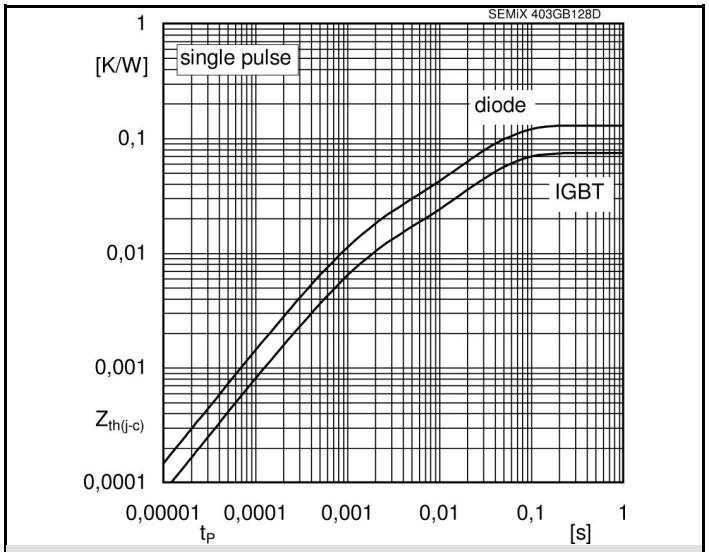

Fig. 9 Typ. transient thermal impedance

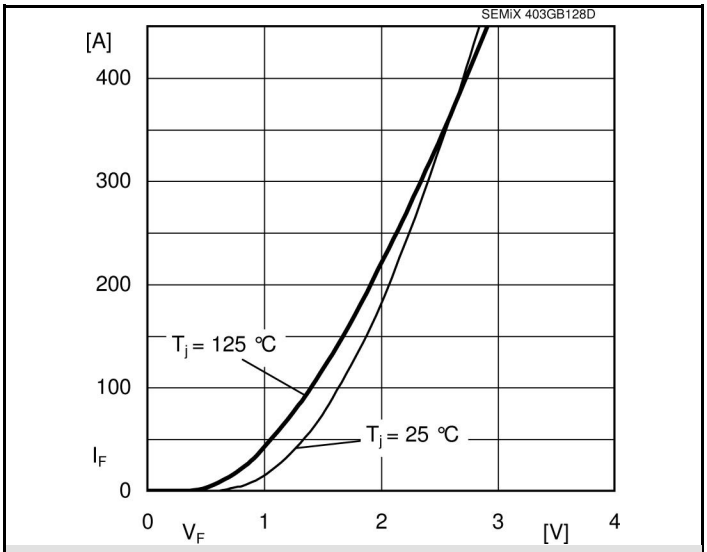

Fig. 10 Typ. CAL diode forward charact., incl. $R_{CC'+EE'}$

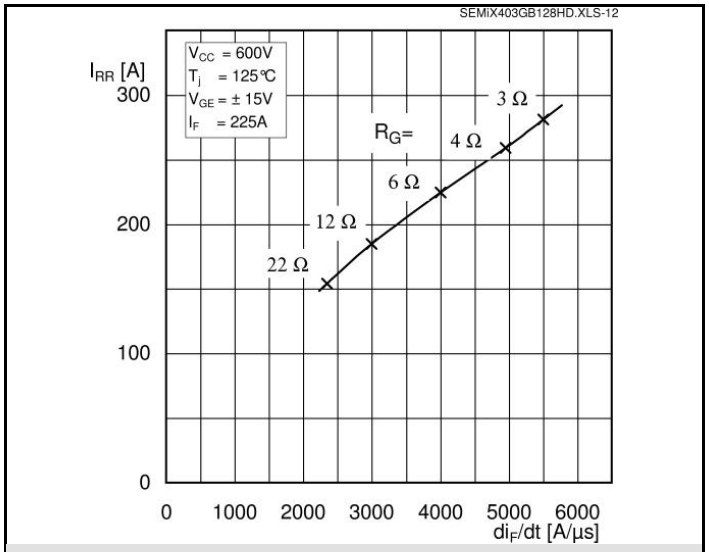

Fig. 11 Typ. CAL diode peak reverse recovery current

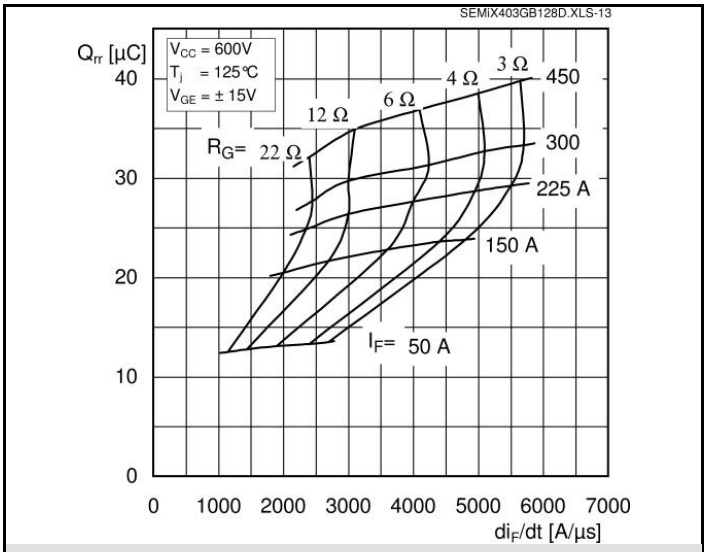

Fig. 12 Typ. CAL diode recovery charge

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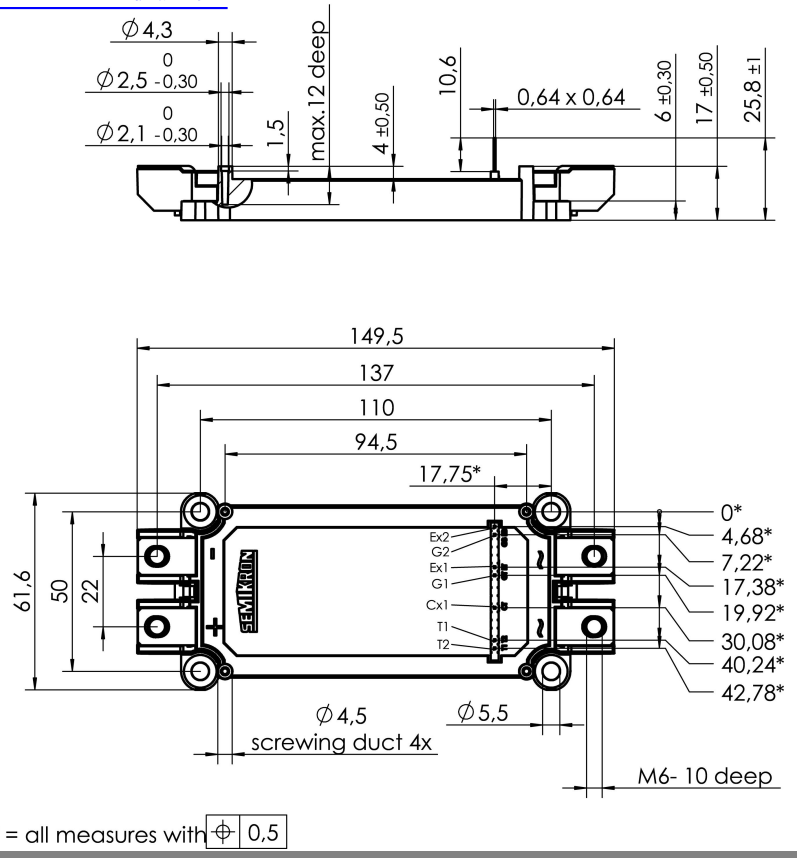

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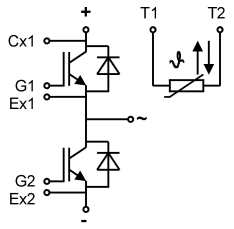

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