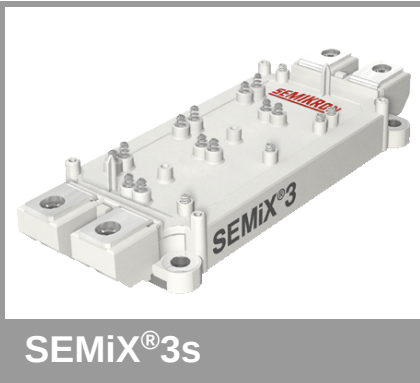


SEMiX703GAR126HDs



Trench IGBT Modules

SEMiX703GAR126HDs

Preliminary Data

Features

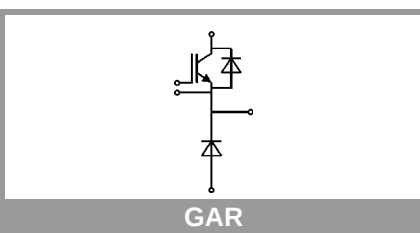
- Homogeneous Si
- Trench = Trenchgate technology
- $V_{CE(sat)}$ with positive temperature coefficient
- High short circuit capability
- UL recognised file no. E63532

Typical Applications

- AC inverter drives
- UPS
- Electronic Welding

Remarks

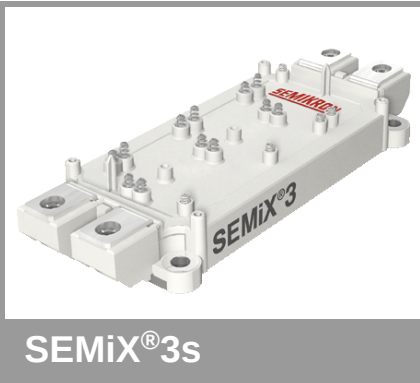
- Case temperatur limited to $T_C=125^\circ\text{C}$ max.
- Not for new design



Absolute Maximum Ratings				
Symbol	Conditions		Values	Unit
IGBT				
V _{CES}			1200	V
I _C	T _j = 150°C	T _c = 25°C	642	A
		T _c = 80°C	449	A
I _{CRM}	I _{CRM} = 2xI _{Cnom}		900	A
V _{GES}			-20 ... 20	V
t _{psc}	V _{CC} = 600V V _{GE} ≤ 20V T _j = 125°C V _{CES} ≤ 1200V		10	μs
T _j			-40 ... 150	°C
Inverse diode				
I _F	T _j = 150°C	T _c = 25°C	561	A
		T _c = 80°C	384	A
I _{FRM}	I _{FRM} = 2xI _{Fnom}		900	A
I _{FSM}	t _p = 10ms, half sine wave, T _j = 25°C		2900	A
T _j			-40 ... 150	°C
Freewheeling diode				
I _F	T _j = 150°C	T _c = 25°C	561	A
		T _c = 80°C	384	A
I _{FRM}	I _{FRM} = 2xI _{Fnom}		900	A
I _{FSM}	t _p = 10ms, half sine wave, T _j = 25°C		2900	A
T _j			-40 ... 150	°C
Module				
I _{t(RMS)}			600	A
T _{stg}			-40 ... 125	°C
V _{isol}	AC sinus 50Hz, t = 60s		4000	V

Characteristics						
Symbol	Conditions		min.	typ.	max.	Unit
IGBT						
V _{CE(sat)}	I _{Cnom} = 450A V _{GE} = 15V chipelevel	T _j = 25°C		1.7	2.1	V
		T _j = 125°C		2.00	2.45	V
V _{CE0}		T _j = 25°C		1	1.2	V
		T _j = 125°C		0.9	1.1	V
r _{CE}	V _{GE} = 15V	T _j = 25°C		1.6	2.0	mΩ
		T _j = 125°C		2.4	3.0	mΩ
V _{GE(th)}	V _{GE} =V _{CE} , I _C = 18mA		5	5.8	6.5	V
I _{CES}	V _{GE} = 0V	T _j = 25°C		0.1	0.3	mA
	V _{CE} = 1200V	T _j = 125°C				mA
C _{ies}	V _{CE} = 25V V _{GE} = 0V	f = 1MHz		32.3		nF
C _{oes}		f = 1MHz		1.69		nF
C _{res}		f = 1MHz		1.46		nF
Q _G	V _{GE} = - 8 V...+ 15 V			3600		nC
R _{Gint}	T _j = 25°C			1.67		Ω
t _{d(on)}	V _{CC} = 600V	I _{Cnom} = 450A T _j = 125°C R _{G on} = 1.6Ω R _{G off} = 1.6Ω		310		ns
t _r	I _{Cnom} = 450A			60		ns
E _{on}	T _j = 125°C			32		mJ
t _{d(off)}	R _{G on} = 1.6Ω			680		ns
t _f	R _{G off} = 1.6Ω			135		ns
E _{off}				68		mJ
R _{th(j-c)}	per IGBT				0.061	K/W

SEMiX703GAR126HDs



Trench IGBT Modules

SEMiX703GAR126HDs

Preliminary Data

Features

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

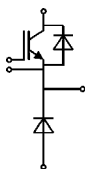
Typical Applications

- AC inverter drives
- UPS
- Electronic Welding

Remarks

- Case temperatur limited to $T_C=125^\circ\text{C}$ max.
- Not for new design

Characteristics					
Symbol	Conditions		min.	typ.	max. Unit
Inverse diode					
$V_F = V_{EC}$	$I_{Fnom} = 450\text{A}$ $V_{GE} = 0\text{V}$ chipelevel	$T_j = 25^\circ\text{C}$		1.6	1.8 V
		$T_j = 125^\circ\text{C}$		1.6	1.8 V
V_{F0}		$T_j = 25^\circ\text{C}$	0.9	1	1.1 V
		$T_j = 125^\circ\text{C}$	0.7	0.8	0.9 V
r_F		$T_j = 25^\circ\text{C}$	1.1	1.3	1.6 mΩ
		$T_j = 125^\circ\text{C}$	1.6	1.8	2.0 mΩ
I_{RRM}	$I_{Fnom} = 450\text{A}$	$T_j = 125^\circ\text{C}$		580	A
Q_{rr}	$di/dt_{off} = 8500\text{A}/\mu\text{s}$ $V_{GE} = -15\text{V}$	$T_j = 125^\circ\text{C}$		130	μC
E_{rr}	$V_{CC} = 600\text{V}$	$T_j = 125^\circ\text{C}$		60	mJ
$R_{th(j-c)D}$	per diode			0.11	K/W
Freewheeling diode					
$V_F = V_{EC}$	$I_{Fnom} = 450\text{A}$ $V_{GE} = 0\text{V}$ level = chipelevel	$T_j = 25^\circ\text{C}$		1.6	1.8 V
		$T_j = 125^\circ\text{C}$		1.6	1.8 V
V_{F0}		$T_j = 25^\circ\text{C}$	0.9	1	1.1 V
		$T_j = 125^\circ\text{C}$	0.7	0.8	0.9 V
r_F		$T_j = 25^\circ\text{C}$	1.1	1.3	1.6 mΩ
		$T_j = 125^\circ\text{C}$	1.6	1.8	2.0 mΩ
I_{RRM}	$I_F = 450\text{A}$	$T_j = 125^\circ\text{C}$		580	A
Q_{rr}	$di/dt_{off} = 8500\text{A}/\mu\text{s}$ $V_{GE} = -15\text{V}$	$T_j = 125^\circ\text{C}$		130	μC
E_{rr}	$V_{CC} = 600\text{V}$	$T_j = 125^\circ\text{C}$		60	mJ
$R_{th(j-c)D}$	per diode			0.11	K/W
Module					
L_{CE}				20	nH
$R_{CC'+EE'}$	res., terminal-chip	$T_C = 25^\circ\text{C}$		0.7	mΩ
		$T_C = 125^\circ\text{C}$		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
w				300	g
Temperature sensor					
R_{100}	$T_C=100^\circ\text{C}$ ($R_{25}=5\text{ k}\Omega$)			0,493 ±5%	kΩ
$B_{100/125}$	$R(T)=R_{100}\exp[B_{100/125}(1/T-1/T_{100})]$; $T[K]$;			3550 ±2%	K



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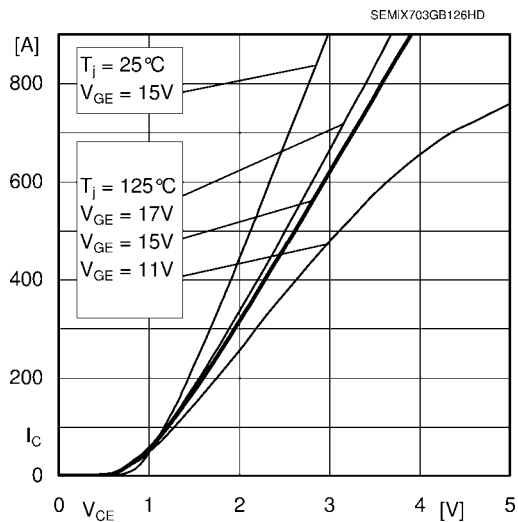


Fig. 1 Typ. output characteristic, inclusive $R_{CC'}+EE'$

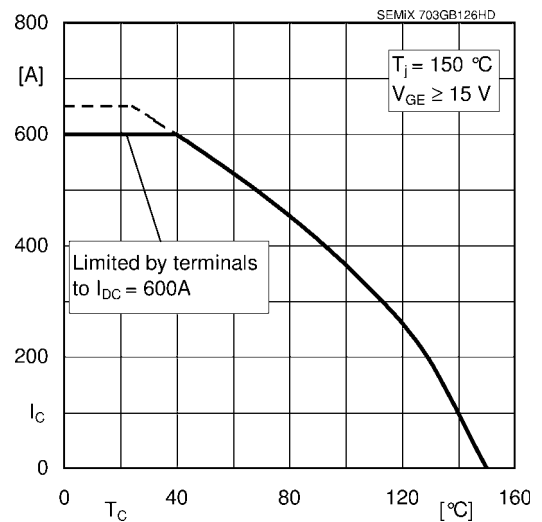


Fig. 2 Rated current vs. temperature $I_C = f(T_C)$

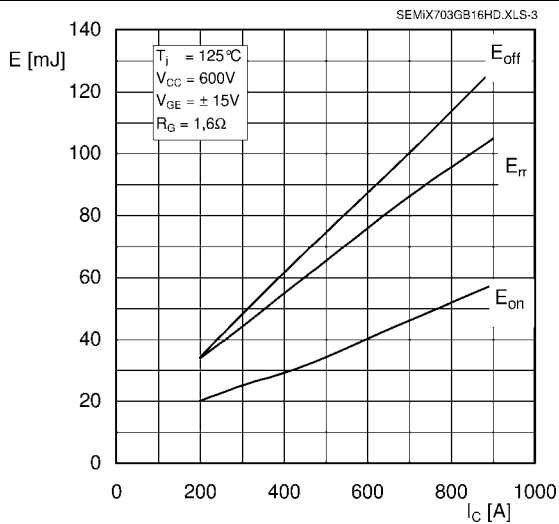


Fig. 3 Typ. turn-on /-off energy = $f(I_C)$

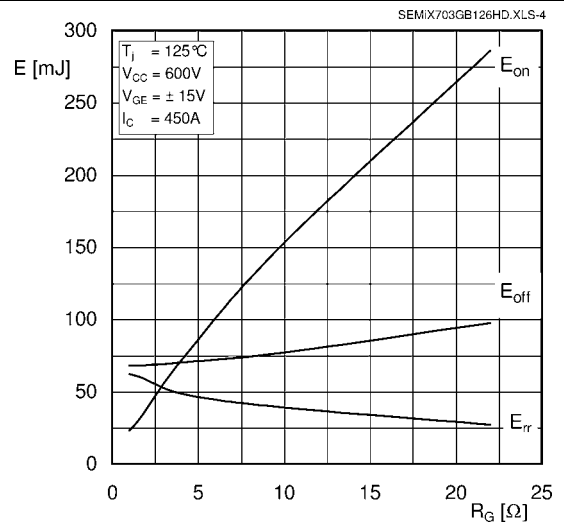


Fig. 4 Typ. turn-on /-off energy = $f(R_G)$

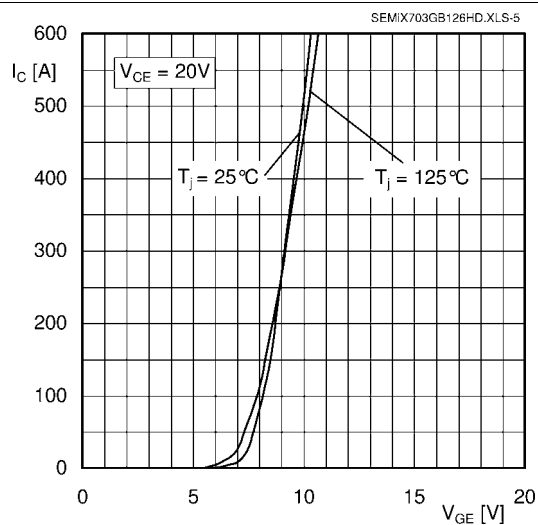


Fig. 5 Typ. transfer characteristic

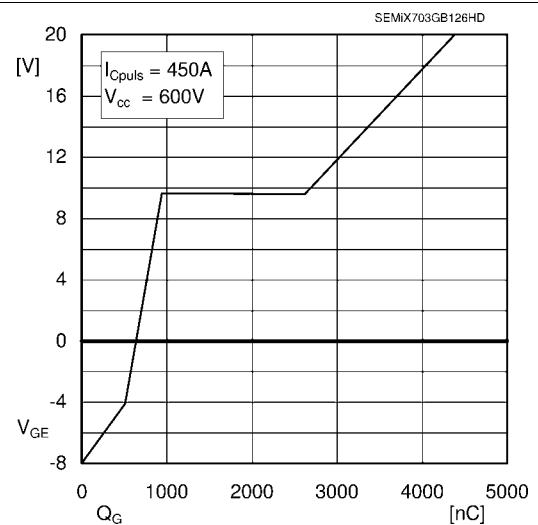


Fig. 6 Typ. gate charge characteristic

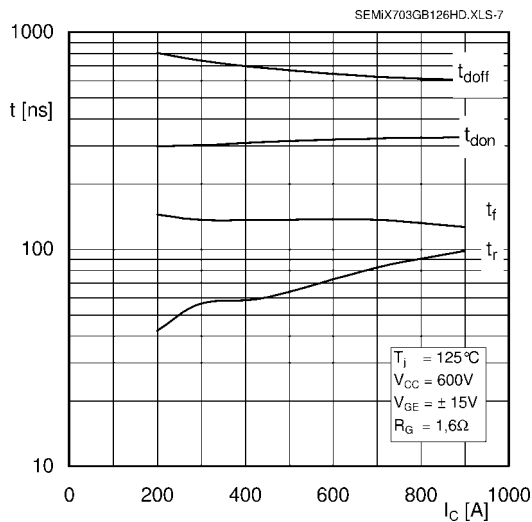


Fig. 7 Typ. switching times vs. I_C

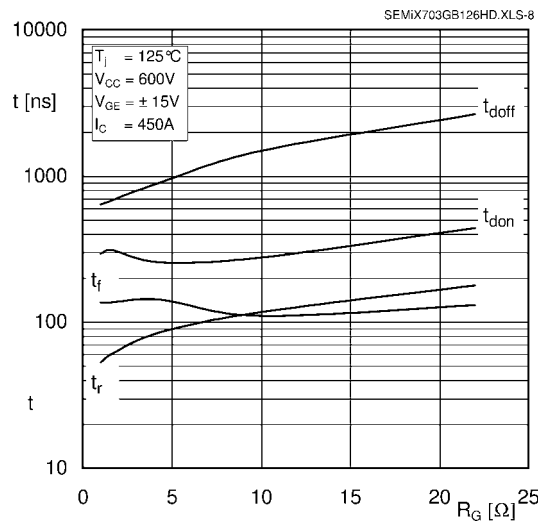


Fig. 8 Typ. switching times vs. gate resistor R_G

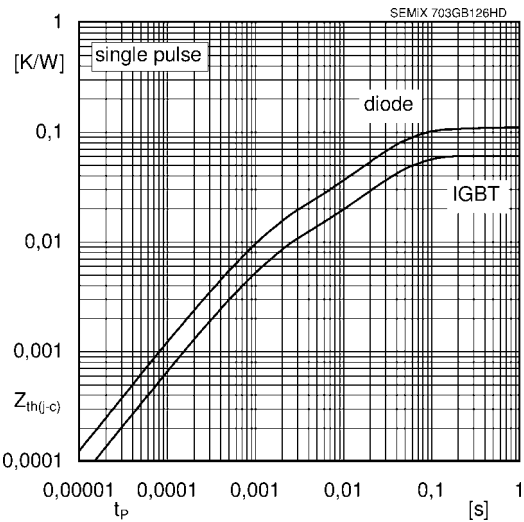


Fig. 9 Typ. transient thermal impedance

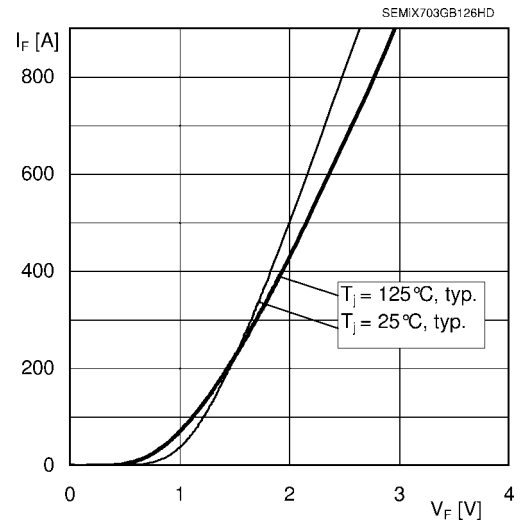


Fig. 10 Typ. CAL diode forward charact., incl. $R_{CC'+EE'}$

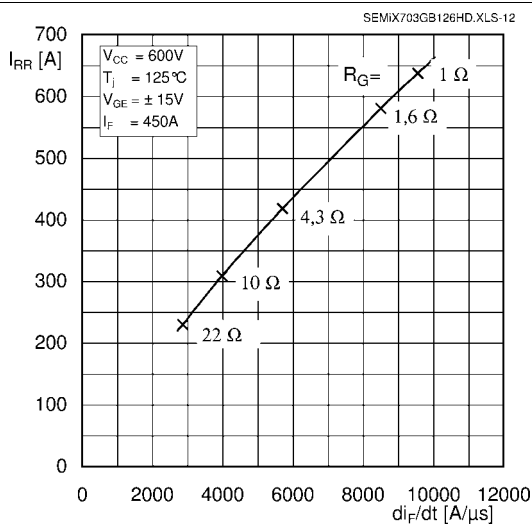


Fig. 11 Typ. CAL diode peak reverse recovery current

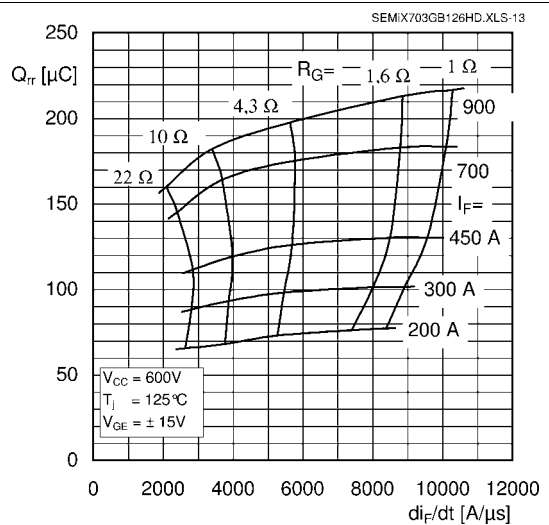
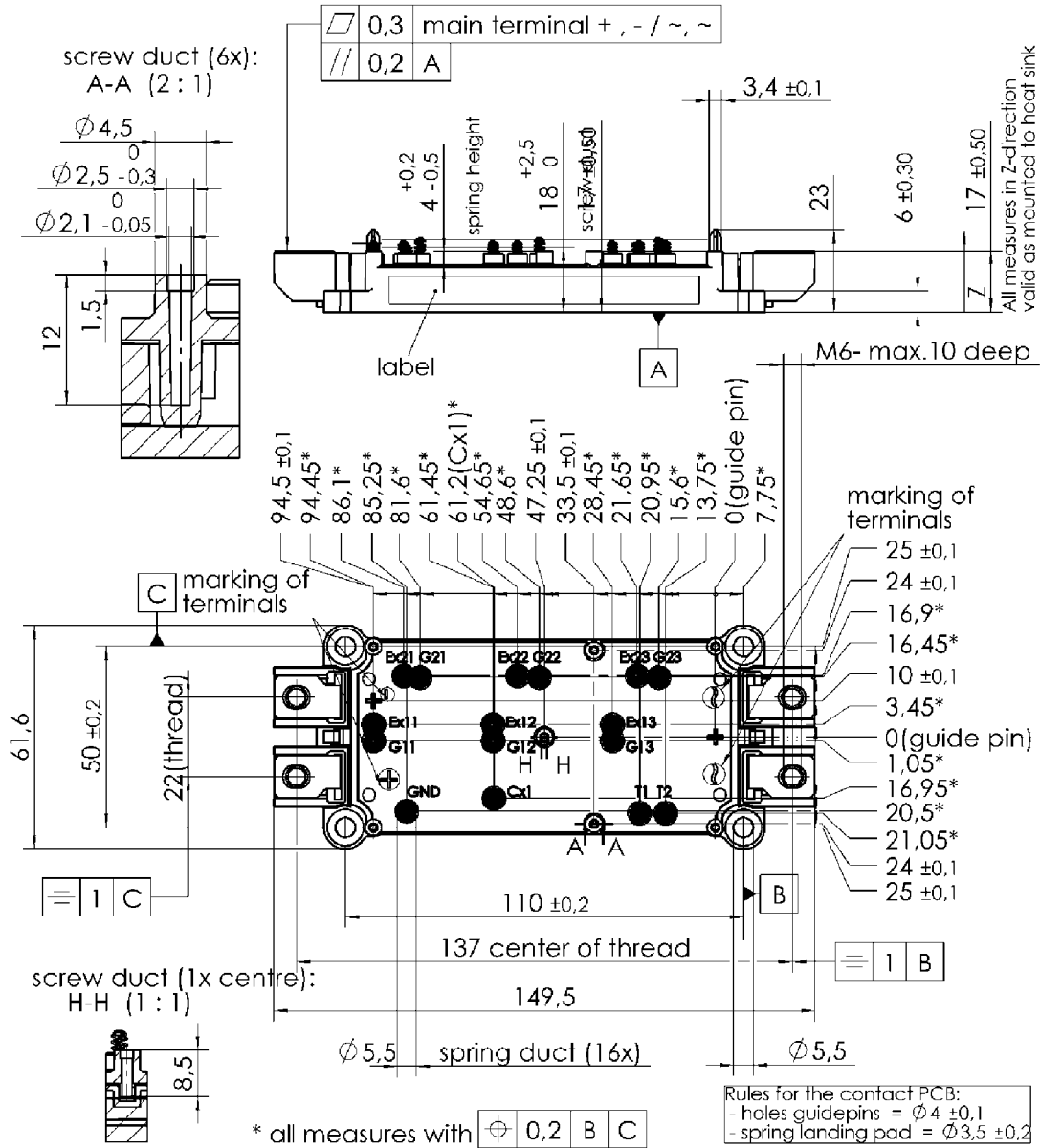
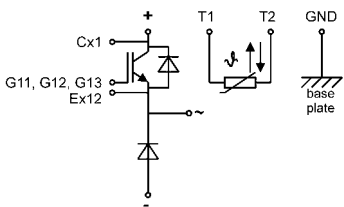


Fig. 12 Typ. CAL diode recovery charge

case: SEMiX 3s



SEMIX 3s



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

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