

SKM 400GA124D



SEMITRANS™ 4

Low Loss IGBT Modules

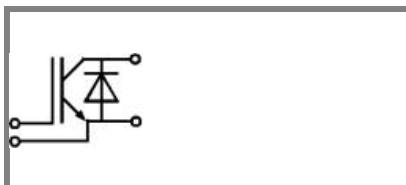
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Features

- MOS input (voltage controlled)
- N channel, homogeneous Si-structure (NPT- Non punch-through IGBT)
- Low inductance case
- Very low tail current with low temperature dependence
- High short circuit capability, self limiting to $6 \times I_{Cnom}$
- Latch-up free
- Fast & soft inverse CAL diodes
- Isolated copper baseplate using DBC Direct Copper Bonding Technology
- Large clearance (12 mm) and creepage distances (20 mm)

Typical Applications

- Switching (not for linear use)
- Inverter drives
- UPS



GA

Absolute Maximum Ratings		$T_c = 25^\circ\text{C}$, unless otherwise specified	
Symbol	Conditions	Values	Units
IGBT			
V_{CES}		1200	V
I_C	$T_c = 25 (85)^\circ\text{C}$	600 (400)	A
I_{CRM}	$t_p = 1 \text{ ms}$	600	A
V_{GES}		± 20	V
T_{vj} , (T_{stg})	$T_{OPERATION} \leq T_{stg}$	- 40 ... + 150 (125)	$^\circ\text{C}$
V_{isol}	AC, 1 min.	2500	V
Inverse diode			
I_F	$T_c = 25 (80)^\circ\text{C}$	390 (260)	A
I_{FRM}	$t_p = 1 \text{ ms}$	600	A
I_{FSM}	$t_p = 10 \text{ ms}$; sin.; $T_j = 150^\circ\text{C}$	2900	A

Characteristics		$T_c = 25^\circ\text{C}$, unless otherwise specified			Units
Symbol	Conditions	min.	typ.	max.	Units
IGBT					
$V_{GE(th)}$	$V_{GE} = V_{CE}$, $I_C = 12 \text{ mA}$	4,5	5,5	6,5	V
I_{CES}	$V_{GE} = 0$, $V_{CE} = V_{CES}$, $T_j = 25 (125)^\circ\text{C}$		0,1	0,3	mA
$V_{CE(TO)}$	$T_j = 25 (125)^\circ\text{C}$		1,1 (1,1)	1,25 (1,25)	V
r_{CE}	$V_{GE} = 15 \text{ V}$, $T_j = 25 (125)^\circ\text{C}$		3,3 (4,3)	4 (5,3)	m Ω
$V_{CE(sat)}$	$I_{Cnom} = 300 \text{ A}$, $V_{GE} = 15 \text{ V}$, chip level		2,1 (2,4)	2,45 (2,85)	V
C_{ies}	under following conditions		22	30	nF
C_{oes}	$V_{GE} = 0$, $V_{CE} = 25 \text{ V}$, $f = 1 \text{ MHz}$		3,3	4	nF
C_{res}			1,2	1,6	nF
L_{CE}				20	nH
$R_{CC+EE'}$	res., terminal-chip $T_c = 25 (125)^\circ\text{C}$		0,18 (0,22)		m Ω
$t_{d(on)}$	$V_{CC} = 600 \text{ V}$, $I_{Cnom} = 300 \text{ A}$		89		ns
t_r	$R_{Gon} = R_{Goff} = 5 \Omega$, $T_j = 125^\circ\text{C}$		77		ns
$t_{d(off)}$	$V_{GE} = \pm 15 \text{ V}$		690		ns
t_f			70		ns
$E_{on} (E_{off})$			36 (42)		mJ
Inverse diode					
$V_F = V_{EC}$	$I_{Fnom} = 300 \text{ A}$; $V_{GE} = 0 \text{ V}$; $T_j = 25 (125)$		2 (1,8)	2,5	V
$V_{(TO)}$	$T_j = 125 ()^\circ\text{C}$			1,2	V
r_T	$T_j = 125 ()^\circ\text{C}$			3,5	m Ω
I_{RRM}	$I_{Fnom} = 300 \text{ A}$; $T_j = 125 ()^\circ\text{C}$		154		A
Q_{rr}	$di/dt = \text{A}/\mu\text{s}$		37		μC
E_{rr}	$V_{GE} = \text{V}$				mJ
Thermal characteristics					
$R_{th(j-c)}$	per IGBT			0,045	K/W
$R_{th(j-c)D}$	per Inverse Diode			0,125	K/W
$R_{th(c-s)}$	per module			0,038	K/W
Mechanical data					
M_s	to heatsink M6	3		5	Nm
M_t	to terminals M6 (M4)	2,5 (1,1)		5 (2)	Nm
w				330	g

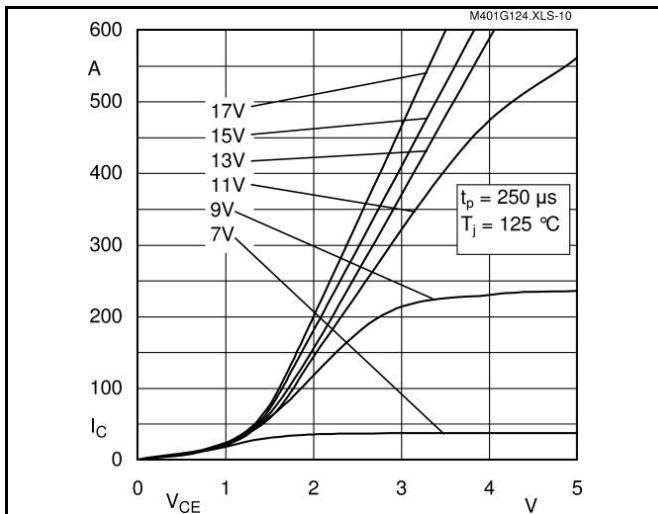


Fig. 1 Typ. output characteristic, inclusive R_{CC+EE}

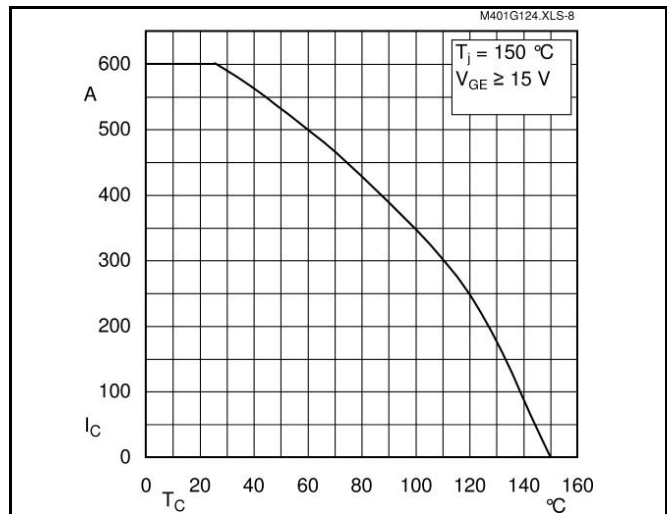


Fig. 2 Rated current vs. temperature $I_C = f(T_C)$

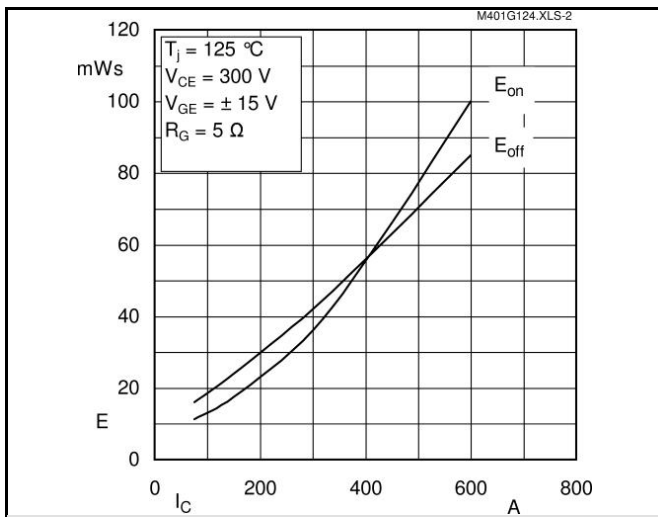


Fig. 3 Typ. turn-on /-off energy = $f(I_C)$

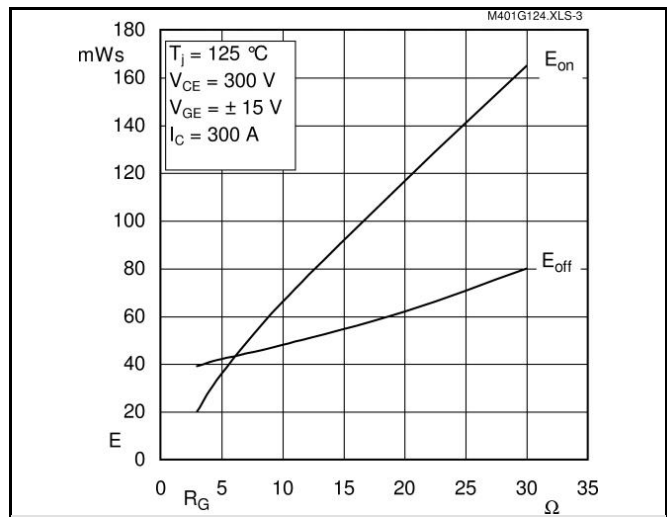


Fig. 4 Typ. turn-on /-off energy = $f(R_G)$

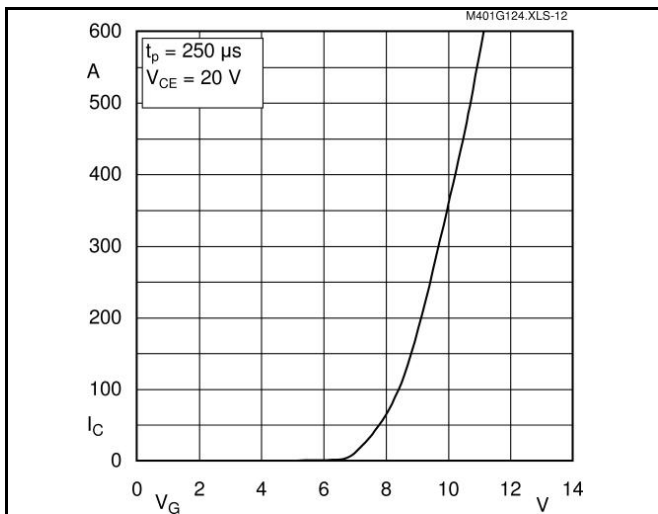


Fig. 5 Typ. transfer characteristic

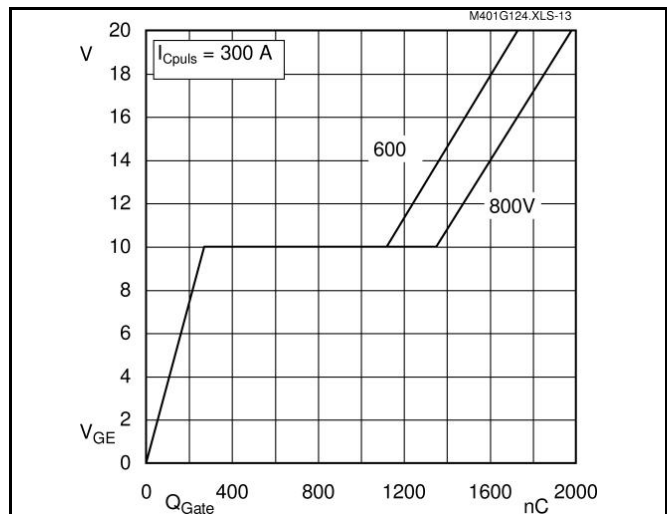
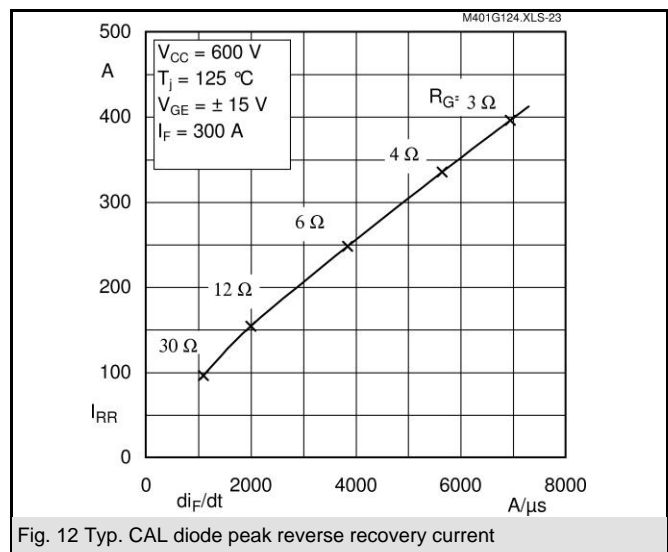
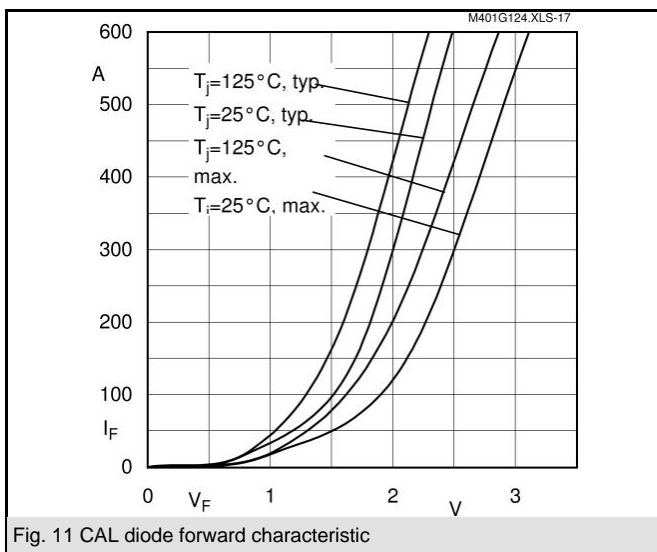
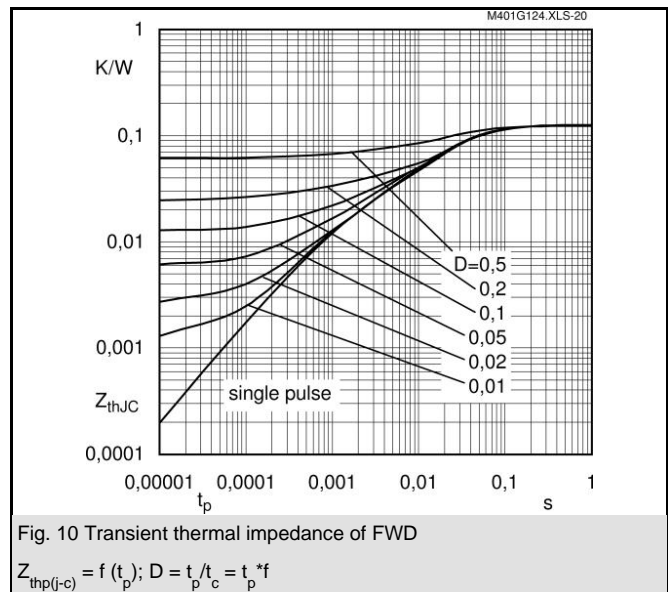
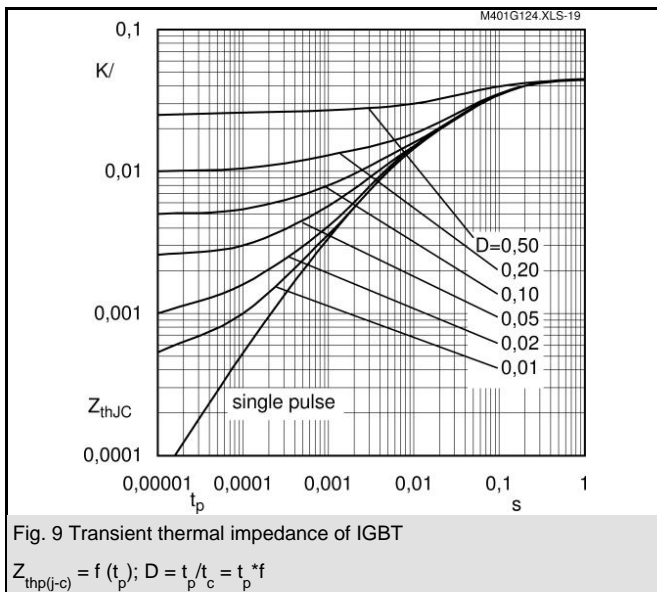
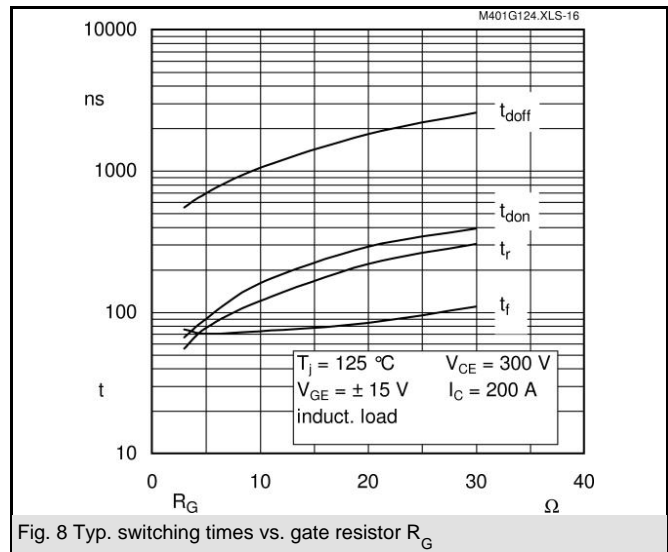
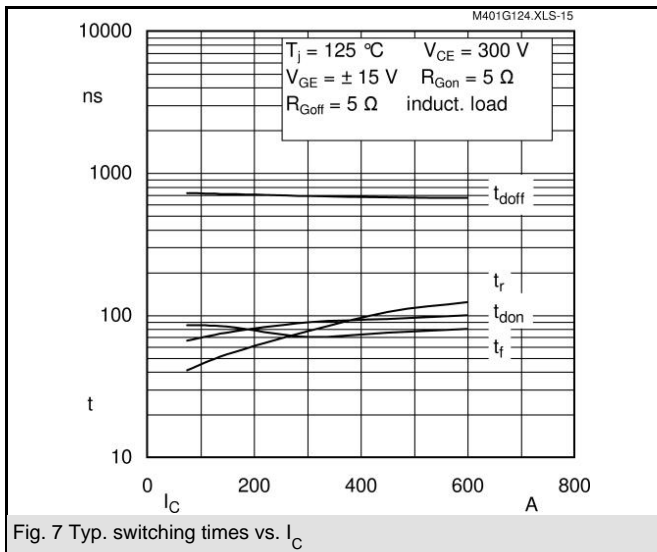


Fig. 6 Typ. gate charge characteristic



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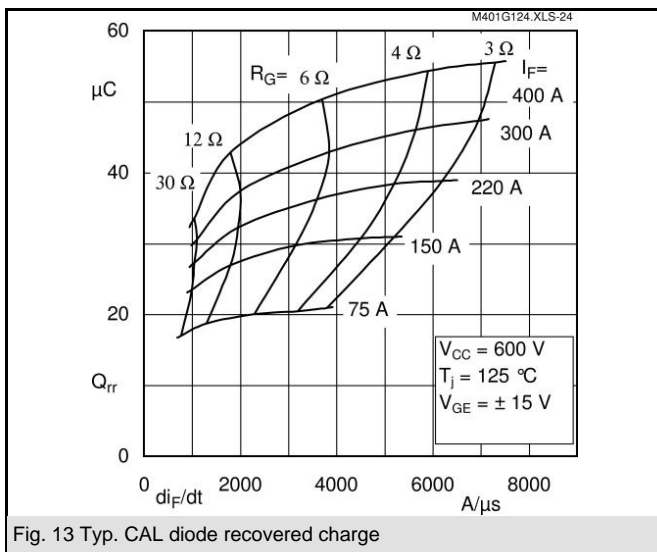
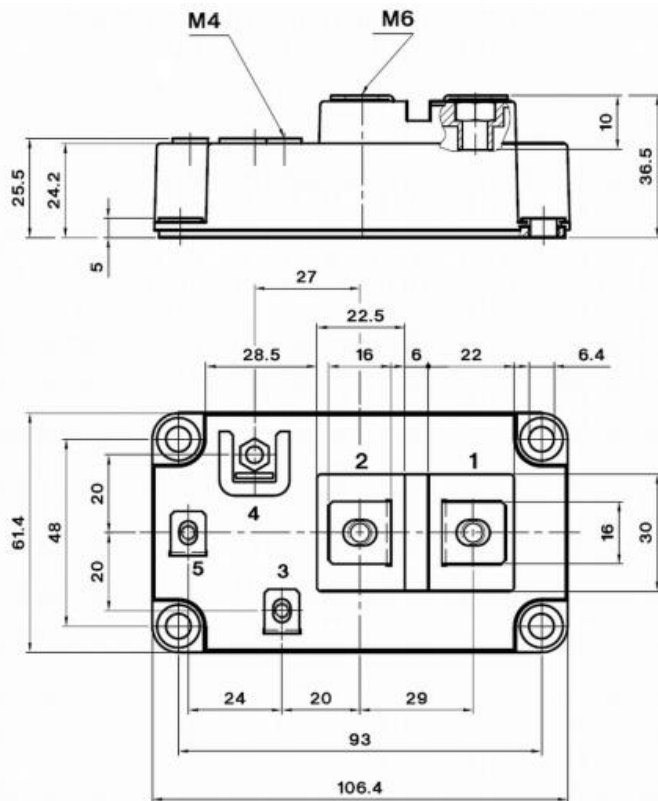


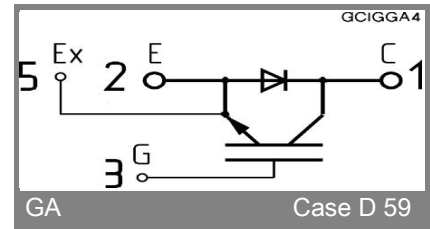
Fig. 13 Typ. CAL diode recovered charge

UL Recognized
 File no. E 63 532

Dimensions in mm



Case D 59



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

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