



**SEMITRANS® 3**

## Trench IGBT Module

**SKM 600GB126D**

**SKM 600GAL126D**

Preliminary Data

### Features

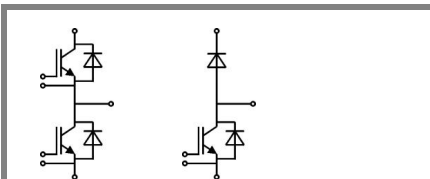
- Trench = Trenchgate technology
- $V_{CEsat}$  with positive temperature coefficient
- High short circuit capability, self limiting to  $6 \times I_C$

### Typical Applications

- AC inverter drives
- UPS
- Electronic welders

### Remarks

- $I_{DC} \leq 500A$  for  $T_{Terminal} = 100^\circ C$



**GB**

**GAL**

Absolute Maximum Ratings		$T_c = 25^\circ C$ , unless otherwise specified		
Symbol	Conditions	Values		Units
<b>IGBT</b>				
$V_{CES}$	$T_j = 25^\circ C$	1200		V
$I_C$	$T_j = 150^\circ C$	$T_c = 25^\circ C$	660	A
		$T_c = 80^\circ C$	460	A
$I_{CRM}$	$I_{CRM} = 2 \times I_{Cnom}$	800		A
$V_{GES}$		$\pm 20$		V
$t_{psc}$	$V_{CC} = 600 V; V_{GE} \leq 20 V; T_j = 125^\circ C$ $V_{CES} < 1200 V$	10		$\mu s$
<b>Inverse Diode</b>				
$I_F$	$T_j = 150^\circ C$	$T_c = 25^\circ C$	490	A
		$T_c = 80^\circ C$	340	A
$I_{FRM}$	$I_{FRM} = 2 \times I_{Fnom}$	800		A
$I_{FSM}$	$t_p = 10 ms; sin.$	$T_j = 150^\circ C$	2880	A
<b>Freewheeling Diode</b>				
$I_F$	$T_j = 150^\circ C$	$T_c = 25^\circ C$	490	A
		$T_c = 80^\circ C$	340	A
$I_{FRM}$	$I_{FRM} = 2 \times I_{Fnom}$	800		A
$I_{FSM}$	$t_p = 10 ms; sin.$	$T_j = 150^\circ C$	2880	A
<b>Module</b>				
$I_{t(RMS)}$		500		A
$T_{vj}$		- 40 ... + 150		$^\circ C$
$T_{stg}$		- 40 ... + 125		$^\circ C$
$V_{isol}$	AC, 1 min.	4000		V

Characteristics		$T_c = 25^\circ C$ , unless otherwise specified			
Symbol	Conditions	min.	typ.	max.	Units
<b>IGBT</b>					
$V_{GE(th)}$	$V_{GE} = V_{CE}, I_C = 16 mA$	5	5,8	6,5	V
$I_{CES}$	$V_{GE} = 0 V, V_{CE} = V_{CES}$	$T_j = 25^\circ C$	0,2	0,6	mA
		$T_j = 125^\circ C$			mA
$V_{CE0}$		$T_j = 25^\circ C$	1	1,2	V
		$T_j = 125^\circ C$	0,9	1,1	V
$r_{CE}$	$V_{GE} = 15 V$	$T_j = 25^\circ C$	1,8	2,4	$m\Omega$
		$T_j = 125^\circ C$	2,8	3,4	$m\Omega$
$V_{CE(sat)}$	$I_{Cnom} = 400 A, V_{GE} = 15 V$	$T_j = 25^\circ C_{chiplev.}$	1,7	2,15	V
		$T_j = 125^\circ C_{chiplev.}$	2	2,45	V
$C_{ies}$	$V_{CE} = 25, V_{GE} = 0 V$	$f = 1 MHz$	32		nF
$C_{oes}$			11		nF
$C_{res}$			2,2		nF
$Q_G$	$V_{GE} = -8V - +20V$	3600		nC	
$R_{Gint}$	$T_j = ^\circ C$	1,88		$\Omega$	
$t_{d(on)}$	$R_{Gon} = 2 \Omega$	$V_{CC} = 600V$ $I_{Cnom} = 400A$	290		ns
$t_r$			60		ns
$E_{on}$			39		mJ
$t_{d(off)}$	$R_{Goff} = 2 \Omega$	$T_j = 125^\circ C$ $V_{GE} = \pm 15V$	670		ns
$t_f$			80		ns
$E_{off}$			64		mJ
$R_{th(j-c)}$	per IGBT	0,055		K/W	



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### Typical Applications

- AC inverter drives
- UPS
- Electronic welders

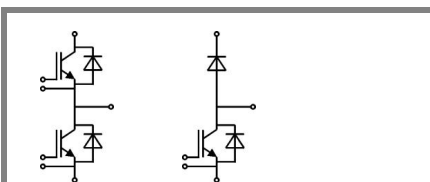
### Remarks

- $I_{DC} \leq 500A$  for  $T_{Terminal} = 100\text{ °C}$

Characteristics				min.	typ.	max.	Units
Symbol	Conditions						
<b>Inverse diode</b>							
$V_F = V_{EC}$	$I_{Fnom} = 400\text{ A}; V_{GE} = 0\text{ V}$	$T_j = 25\text{ °C}_{chiplev.}$		1,6	1,8		V
		$T_j = 125\text{ °C}_{chiplev.}$		1,6	1,8		V
$V_{F0}$		$T_j = 25\text{ °C}$		1	1,1		V
		$T_j = 125\text{ °C}$		0,8	0,9		V
$r_F$		$T_j = 25\text{ °C}$		1,5	1,8		mΩ
		$T_j = 125\text{ °C}$		2	2,3		mΩ
$I_{RRM}$	$I_{Fnom} = 400\text{ A}$	$T_j = 125\text{ °C}$		475			A
$Q_{rr}$	$di/dt = 7600\text{ A}/\mu\text{s}$			96			μC
$E_{rr}$	$V_{GE} = -15\text{ V}; V_{CC} = 600\text{ V}$			41			mJ
$R_{th(j-c)D}$	per diode				0,125		K/W
<b>Freewheeling Diode</b>							
$V_F = V_{EC}$	$I_{Fnom} = 400\text{ A}; V_{GE} = 0\text{ V}$	$T_j = 25\text{ °C}_{chiplev.}$		1,6	1,8		V
		$T_j = 125\text{ °C}_{chiplev.}$		1,6	1,8		V
$V_{F0}$		$T_j = 25\text{ °C}$		1	1,1		V
		$T_j = 125\text{ °C}$		0,8	0,9		V
$r_F$		$T_j = 25\text{ °C}$		1,5	1,8		V
		$T_j = 125\text{ °C}$		2	2,3		V
$I_{RRM}$	$I_{Fnom} = 400\text{ A}$	$T_j = 125\text{ °C}$		475			A
$Q_{rr}$	$di/dt = 7600\text{ A}/\mu\text{s}$			96			μC
$E_{rr}$	$V_{GE} = -15\text{ V}; V_{CC} = 600\text{ V}$			41			mJ
$R_{th(j-c)FD}$	per diode				0,125		K/W
<b>Module</b>							
$L_{CE}$				15	20		nH
$R_{CC'+EE'}$	res., terminal-chip	$T_{case} = 25\text{ °C}$		0,35			mΩ
		$T_{case} = 125\text{ °C}$		0,5			mΩ
$R_{th(c-s)}$	per module				0,038		K/W
$M_s$	to heat sink M6			3	5		Nm
$M_t$	to terminals M6			2,5	5		Nm
w					325		g

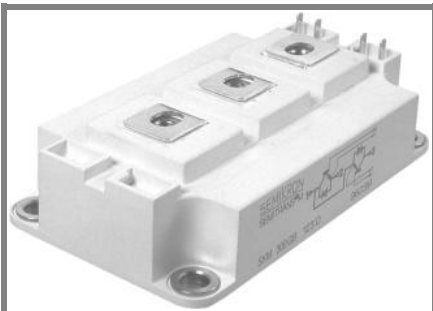
This is an electrostatic discharge sensitive device (ESDS), international standard IEC 60747-1, Chapter IX.

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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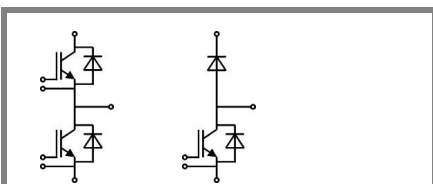
### Typical Applications

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- UPS
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### Remarks

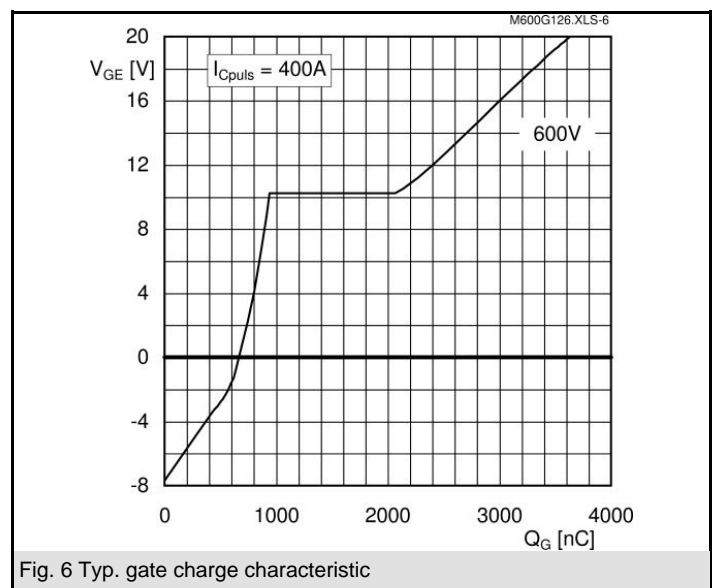
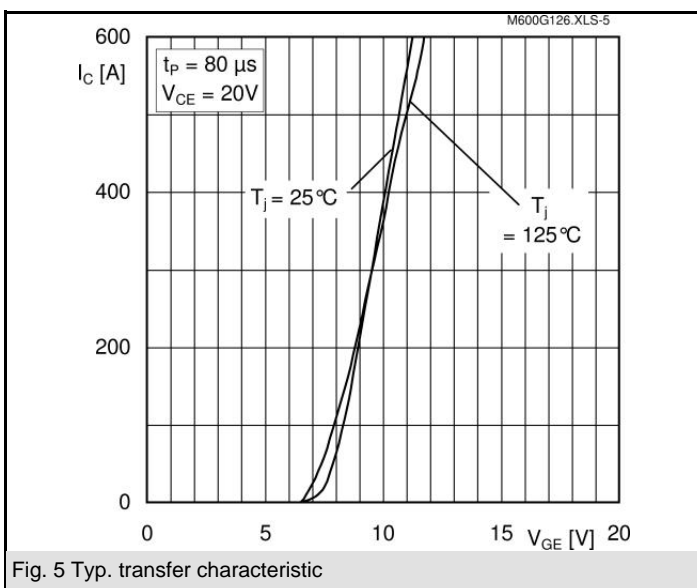
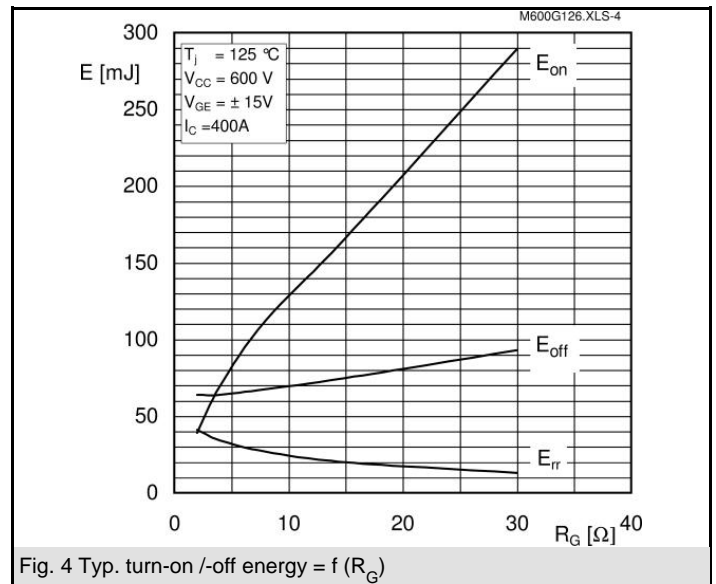
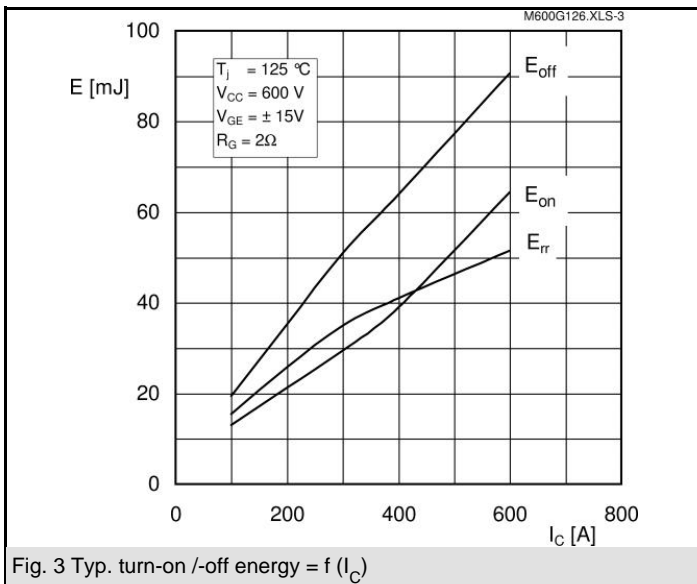
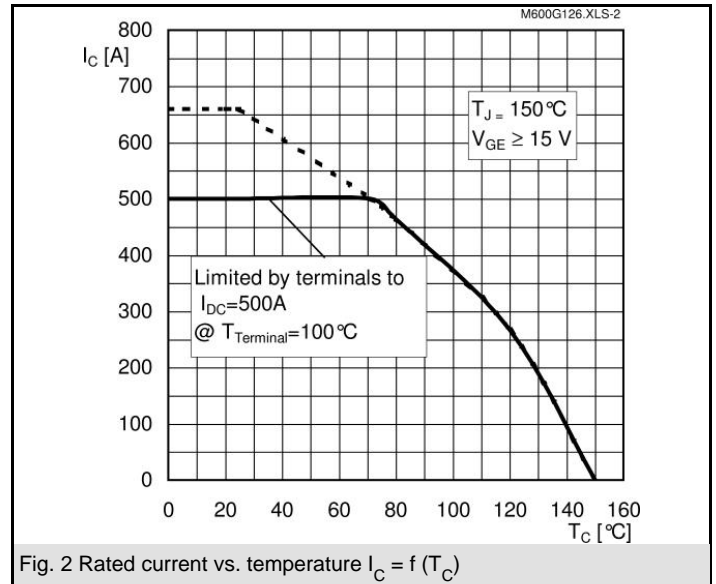
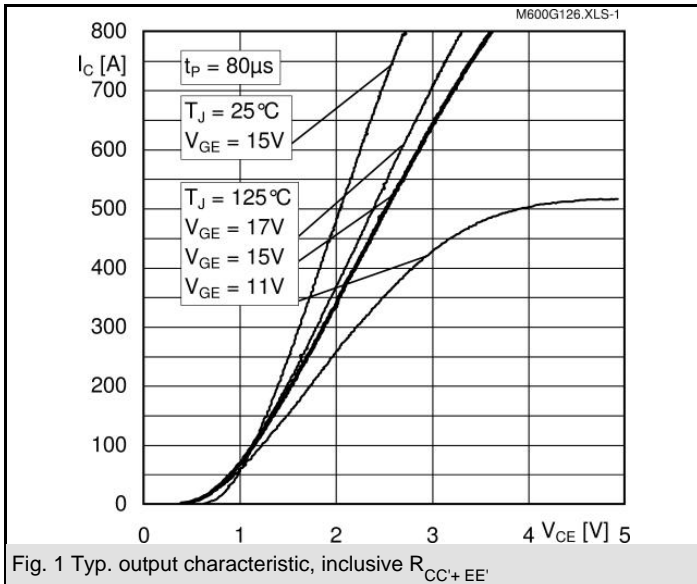
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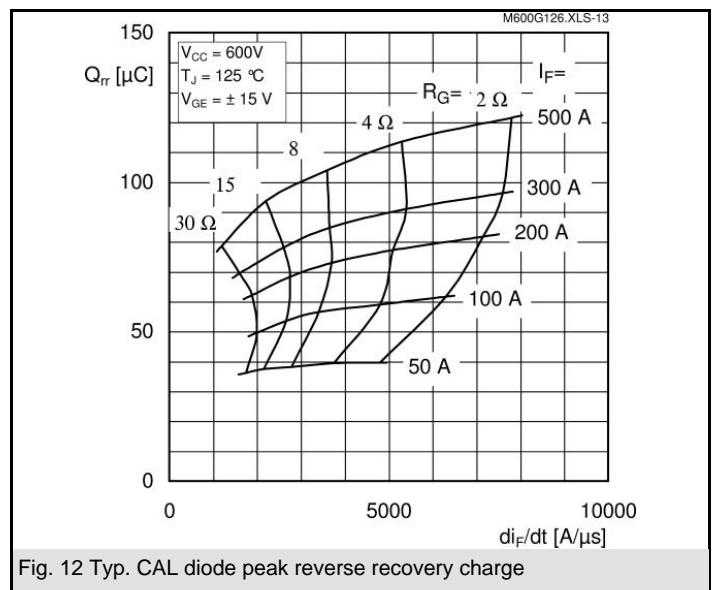
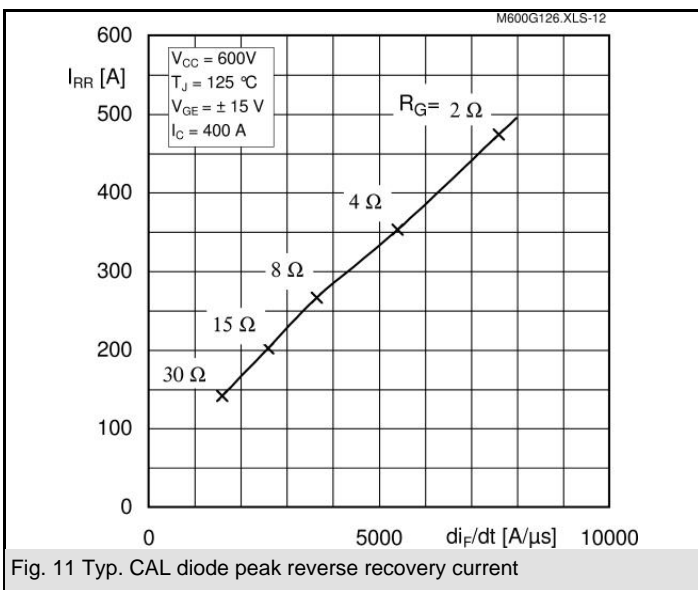
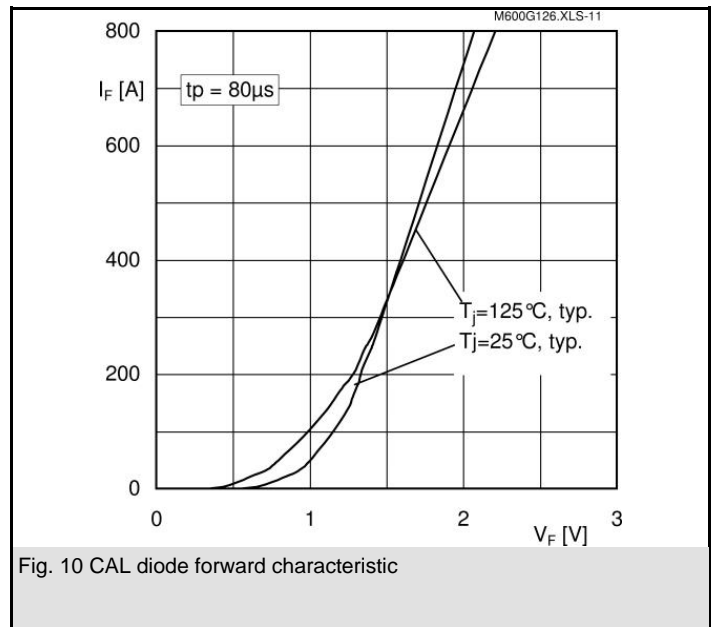
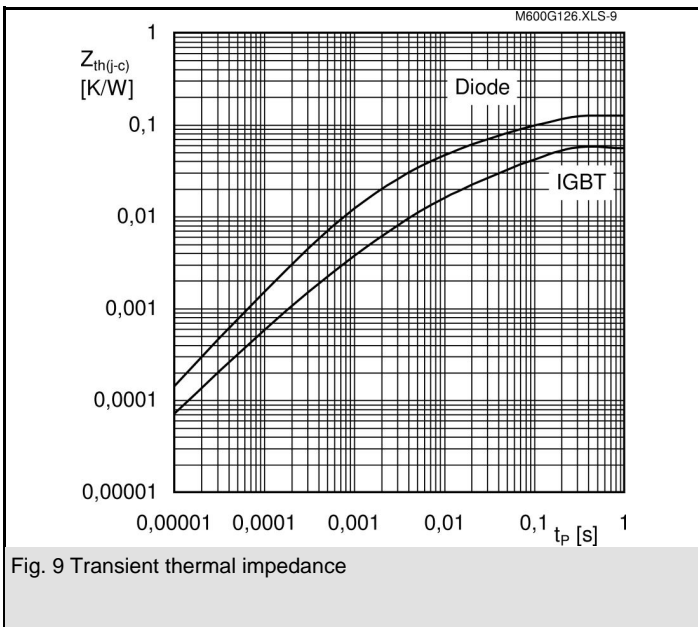
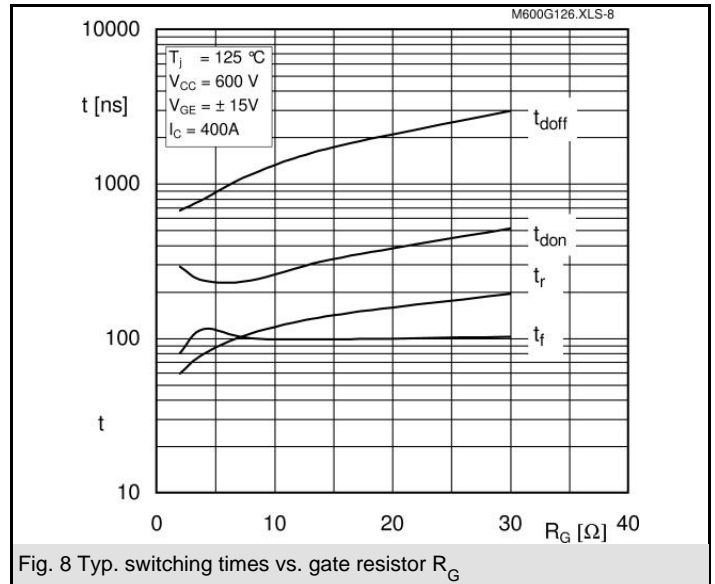
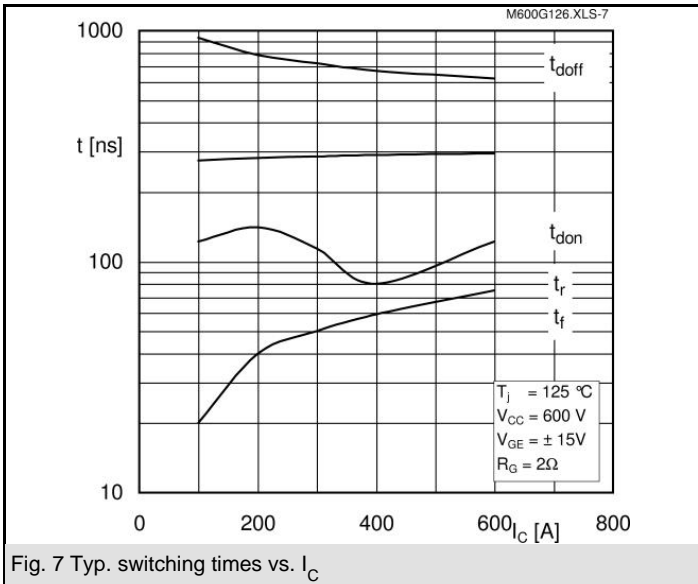
$Z_{th}$		Conditions	Values	Units
<b>Symbol</b>				
<b><math>Z_{th(j-c)I}</math></b>				
$R_{\theta j-c}$	$i = 1$		38	mk/W
$R_{\theta j-c}$	$i = 2$		13	mk/W
$R_{\theta j-c}$	$i = 3$		3,4	mk/W
$R_{\theta j-c}$	$i = 4$		0,6	mk/W
$\tau_{th(j-c)}$	$i = 1$		0,0836	s
$\tau_{th(j-c)}$	$i = 2$		0,009	s
$\tau_{th(j-c)}$	$i = 3$		0,0024	s
$\tau_{th(j-c)}$	$i = 4$		0,0002	s
<b><math>Z_{th(j-c)D}</math></b>				
$R_{\theta j-cD}$	$i = 1$		75	mk/W
$R_{\theta j-cD}$	$i = 2$		39	mk/W
$R_{\theta j-cD}$	$i = 3$		9,5	mk/W
$R_{\theta j-cD}$	$i = 4$		1,5	mk/W
$\tau_{th(j-c)D}$	$i = 1$		0,0327	s
$\tau_{th(j-c)D}$	$i = 2$		0,0101	s
$\tau_{th(j-c)D}$	$i = 3$		0,002	s
$\tau_{th(j-c)D}$	$i = 4$		0,0003	s



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Case D 56



GB Case D 56



GAL Case D 57