

# SKM 200GB176D...



**SEMITRANS® 3**

## Trench IGBT Modules

**SKM 200GB176D**

**SKM 200GAL176D**

### Features

- Homogeneous Si
- 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 mains 575 - 750 V AC
- Public transport (auxiliary syst.)



**GB**

**GAL**

Absolute Maximum Ratings		$T_c = 25^\circ\text{C}$ , unless otherwise specified		
Symbol	Conditions	Values		Units
<b>IGBT</b>				
$V_{CES}$	$T_j = 25^\circ\text{C}$	1700		V
$I_C$	$T_j = 150^\circ\text{C}$	$T_c = 25^\circ\text{C}$	260	A
		$T_c = 80^\circ\text{C}$	180	A
$I_{CRM}$	$I_{CRM} = 2 \times I_{Cnom}$	300		A
$V_{GES}$		$\pm 20$		V
$t_{psc}$	$V_{CC} = 1200\text{ V}; V_{GE} \leq 20\text{ V}; T_j = 125^\circ\text{C}$ $V_{CES} < 1700\text{ V}$	10		$\mu\text{s}$
<b>Inverse Diode</b>				
$I_F$	$T_j = 150^\circ\text{C}$	$T_c = 25^\circ\text{C}$	210	A
		$T_c = 80^\circ\text{C}$	140	A
$I_{FRM}$	$I_{FRM} = 2 \times I_{Fnom}$	300		A
$I_{FSM}$	$t_p = 10\text{ ms}; \text{sin.}$	$T_j = 150^\circ\text{C}$	1100	A
<b>Freewheeling Diode</b>				
$I_F$	$T_j = 150^\circ\text{C}$	$T_{case} = 25^\circ\text{C}$	210	A
		$T_{case} = 80^\circ\text{C}$	140	A
$I_{FRM}$	$I_{FRM} = 2 \times I_{Fnom}$	300		A
$I_{FSM}$	$t_p = 10\text{ ms}; \text{sin.}$	$T_j = 150^\circ\text{C}$	1100	A
<b>Module</b>				
$I_{t(RMS)}$		500		A
$T_{vj}$		- 40 ... + 150		$^\circ\text{C}$
$T_{stg}$		-40...+125		$^\circ\text{C}$
$V_{isol}$	AC, 1 min.	4000		V

Characteristics		$T_c = 25^\circ\text{C}$ , unless otherwise specified			
Symbol	Conditions	min.	typ.	max.	Units
<b>IGBT</b>					
$V_{GE(th)}$	$V_{GE} = V_{CE}, I_C = 6\text{ mA}$	5,2	5,8	6,4	V
$I_{CES}$	$V_{GE} = 0\text{ V}, V_{CE} = V_{CES}$		0,1	0,3	mA
$V_{CE0}$		$T_j = 25^\circ\text{C}$	1	1,2	V
		$T_j = 125^\circ\text{C}$	0,9	1,1	V
$r_{CE}$	$V_{GE} = 15\text{ V}$	$T_j = 25^\circ\text{C}$	6,7	8,3	$\text{m}\Omega$
		$T_j = 125^\circ\text{C}$	10	12	$\text{m}\Omega$
$V_{CE(sat)}$	$I_{Cnom} = 150\text{ A}, V_{GE} = 15\text{ V}$	$T_j = 25^\circ\text{C}_{chiplev.}$	2	2,45	V
		$T_j = 125^\circ\text{C}_{chiplev.}$	2,4	2,9	V
$C_{ies}$	$V_{CE} = 25, V_{GE} = 0\text{ V}$	$f = 1\text{ MHz}$	11,4		nF
$C_{oes}$			0,55		nF
$C_{res}$			0,44		nF
$Q_G$	$V_{GE} = -8\text{V}...+15\text{V}$	1200		nC	
$R_{Gint}$	$T_j = 25^\circ\text{C}$	4,25		$\Omega$	
$t_{d(on)}$	$R_{Gon} = 5\ \Omega$	$V_{CC} = 1200\text{V}$ $I_C = 150\text{A}$	360		ns
			$T_j = 125^\circ\text{C}$	45	ns
$E_{on}$	$R_{Goff} = 5\ \Omega$	$T_j = 125^\circ\text{C}$ $V_{GE} = \pm 15\text{V}$	93		mJ
$t_{d(off)}$			760		ns
$t_f$			140		ns
$E_{off}$			58		mJ
$R_{th(j-c)}$	per IGBT			0,12	K/W



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- High short circuit capability, self limiting to  $6 \times I_c$

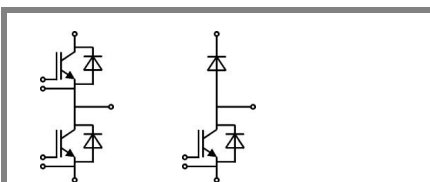
### Typical Applications

- AC inverter drives mains 575 - 750 V AC
- Public transport (auxiliary syst.)

Characteristics				min.	typ.	max.	Units
Symbol	Conditions						
<b>Inverse Diode</b>							
$V_F = V_{EC}$	$I_{Fnom} = 150 \text{ A}; V_{GE} = 0 \text{ V}$	$T_j = 25 \text{ }^\circ\text{C}_{chiplev.}$		1,7	1,9		V
		$T_j = 125 \text{ }^\circ\text{C}_{chiplev.}$		1,7	1,9		V
$V_{F0}$		$T_j = 25 \text{ }^\circ\text{C}$		1,1	1,3		V
		$T_j = 125 \text{ }^\circ\text{C}$		0,9	1,1		V
$r_F$		$T_j = 25 \text{ }^\circ\text{C}$		4	4		mΩ
		$T_j = 125 \text{ }^\circ\text{C}$		5,3	5,3		mΩ
$I_{RRM}$	$I_F = 150 \text{ A}$	$T_j = 125 \text{ }^\circ\text{C}$		195			A
$Q_{rr}$	$di/dt = 3700 \text{ A}/\mu\text{s}$			52			μC
$E_{rr}$	$V_{GE} = -15 \text{ V}; V_{CC} = 1200 \text{ V}$			31			mJ
$R_{th(j-c)D}$	per diode				0,25		K/W
<b>FWD</b>							
$V_F = V_{EC}$	$I_{Fnom} = 150 \text{ A}; V_{GE} = 0 \text{ V}$	$T_j = 25 \text{ }^\circ\text{C}_{chiplev.}$		1,7	1,9		V
		$T_j = 125 \text{ }^\circ\text{C}_{chiplev.}$		1,7	1,9		V
$V_{F0}$		$T_j = 25 \text{ }^\circ\text{C}$		1,1	1,3		V
		$T_j = 125 \text{ }^\circ\text{C}$		0,9	1,1		V
$r_F$		$T_j = 25 \text{ }^\circ\text{C}$		4	4		V
		$T_j = 125 \text{ }^\circ\text{C}$		5,3	5,3		V
$I_{RRM}$	$I_F = 150 \text{ A}$	$T_j = 125 \text{ }^\circ\text{C}$		195			A
$Q_{rr}$	$di/dt = 3700 \text{ A}/\mu\text{s}$			52			μC
$E_{rr}$	$V_{GE} = -15 \text{ V}; V_{CC} = 1200 \text{ V}$			31			mJ
$R_{th(j-c)FD}$	per diode				0,25		K/W
<b>Module</b>							
$L_{CE}$				15	20		nH
$R_{CC'+EE'}$	res., terminal-chip	$T_{case} = 25 \text{ }^\circ\text{C}$		0,35			mΩ
		$T_{case} = 125 \text{ }^\circ\text{C}$		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

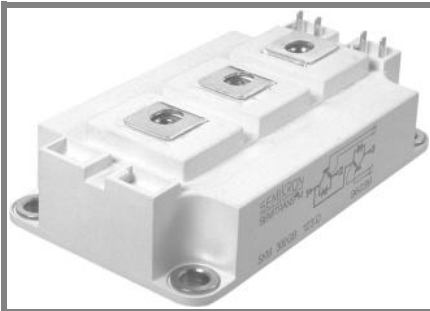
This is an electrostatic discharge sensitive device (ESDS), international standard IEC 60747-1, Chapter IX.

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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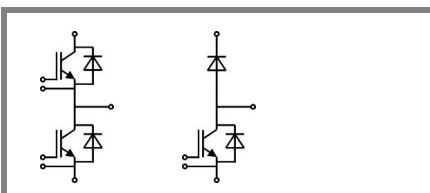
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### Typical Applications

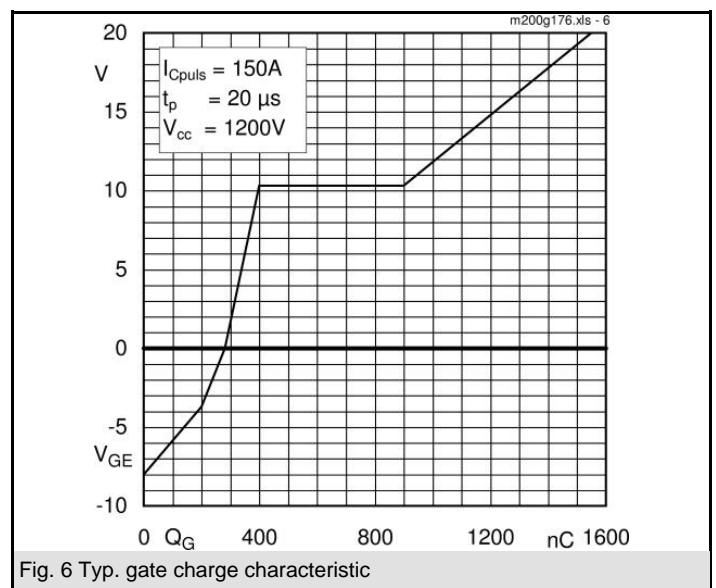
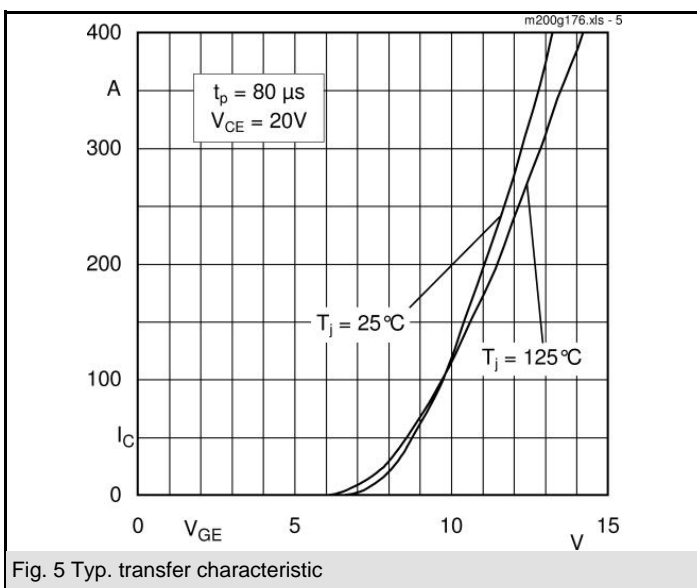
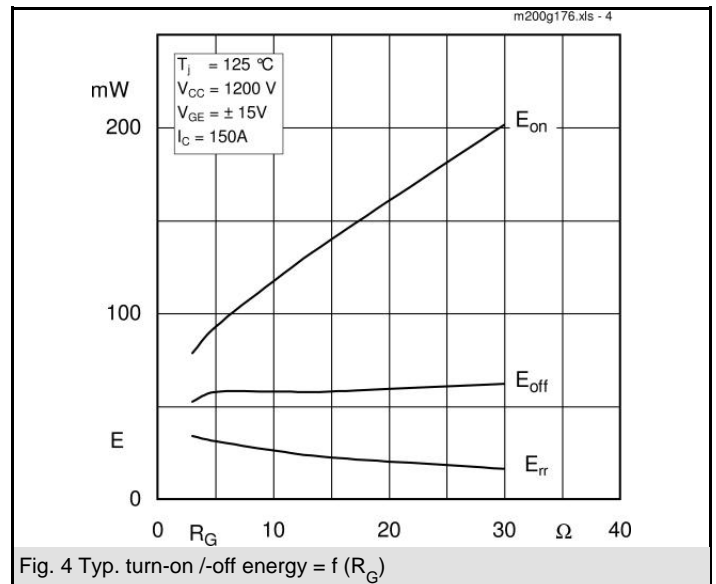
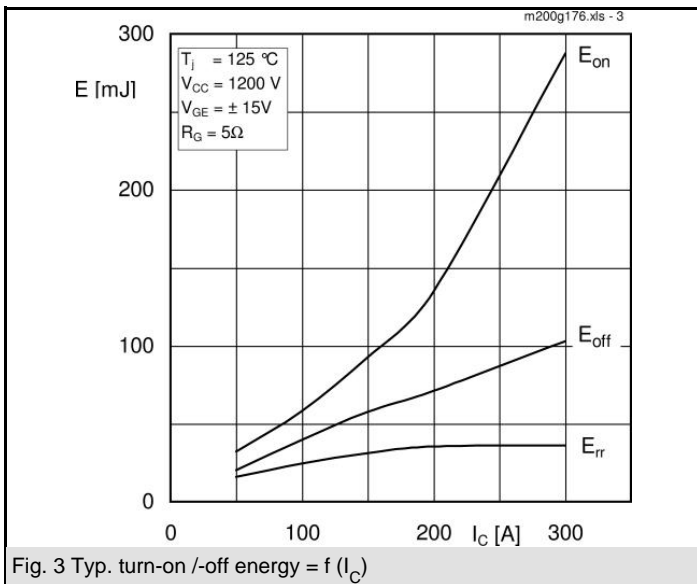
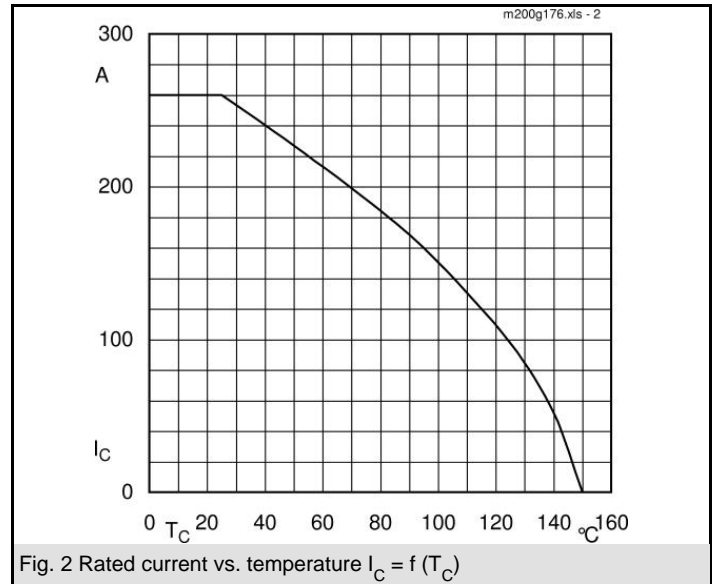
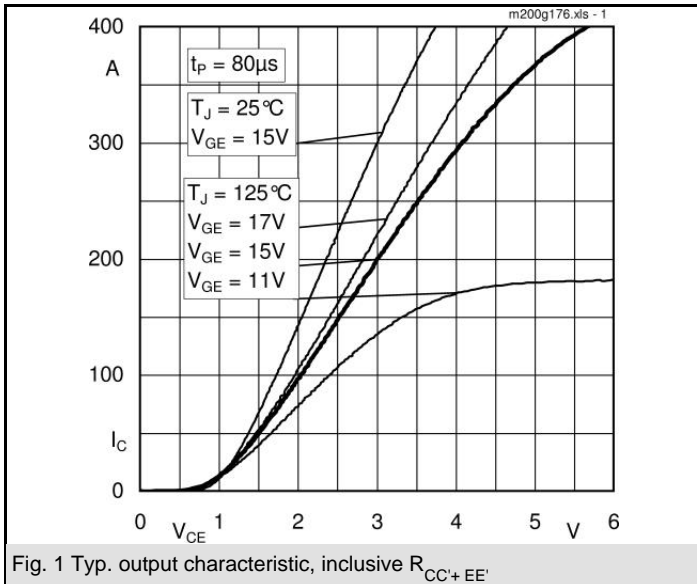
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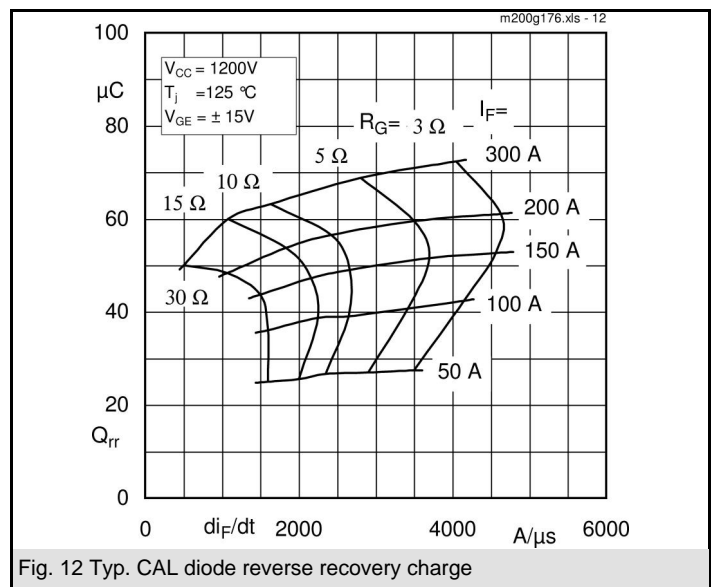
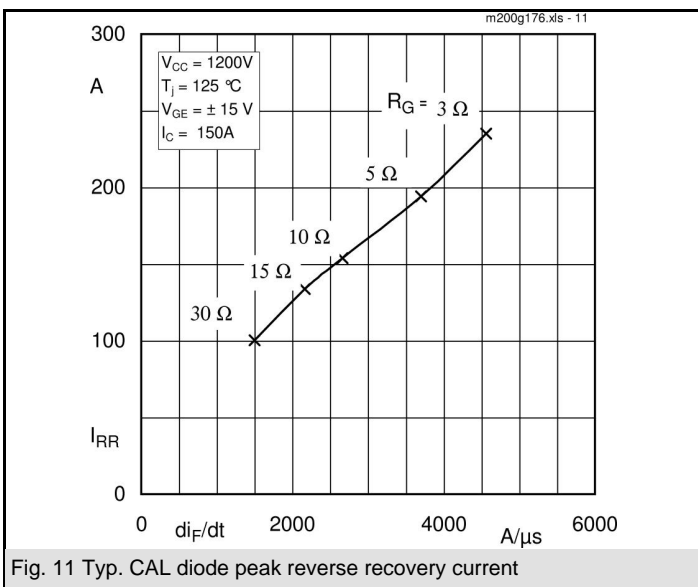
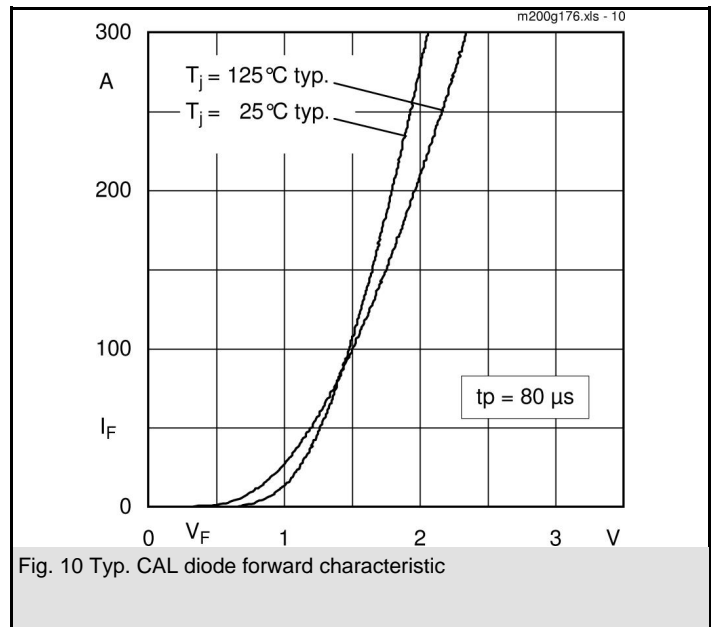
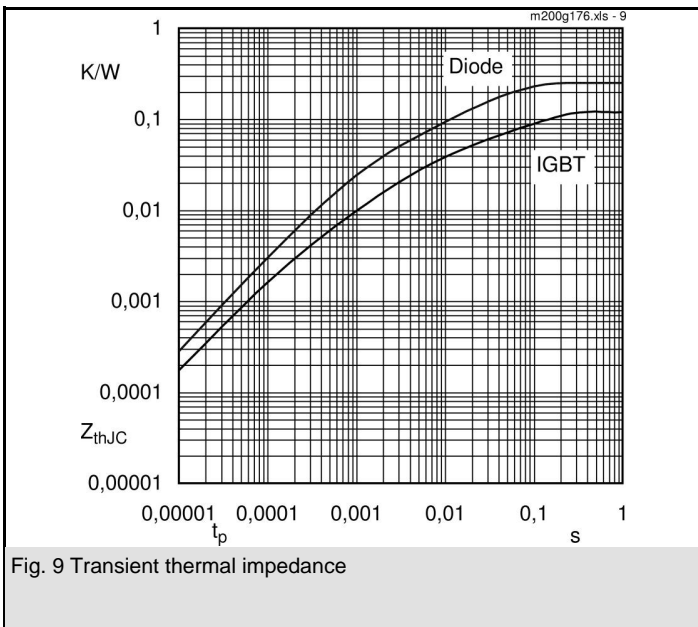
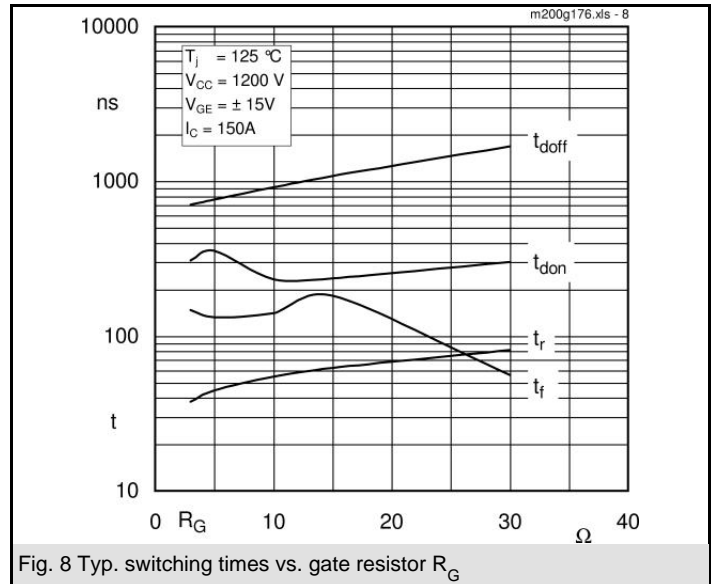
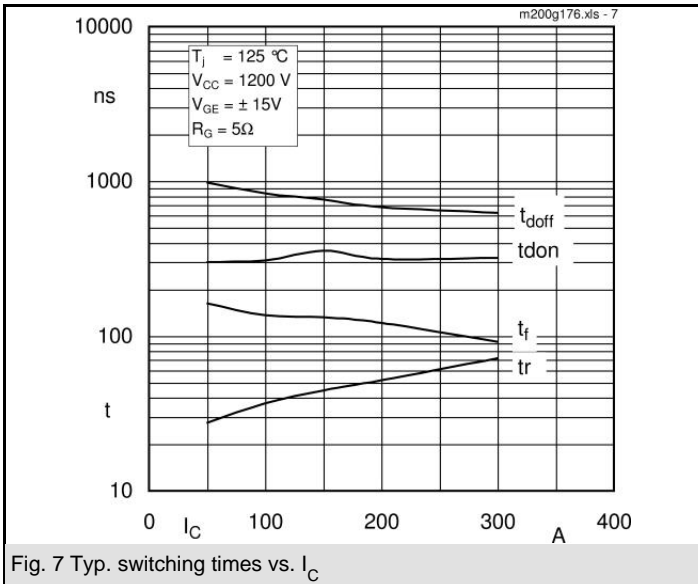
$Z_{th}$		Conditions	Values	Units
<b><math>Z_{th(j-c)I}</math></b>				
$R_{\theta j-c}$		$i = 1$	80	mk/W
$R_{\theta j-c}$		$i = 2$	30	mk/W
$R_{\theta j-c}$		$i = 3$	8,2	mk/W
$R_{\theta j-c}$		$i = 4$	1,8	mk/W
$\tau_{th(j-c)I}$		$i = 1$	0,0753	s
$\tau_{th(j-c)I}$		$i = 2$	0,01	s
$\tau_{th(j-c)I}$		$i = 3$	0,0008	s
$\tau_{th(j-c)I}$		$i = 4$	0,0003	s
<b><math>Z_{th(j-c)D}</math></b>				
$R_{\theta j-c}$		$i = 1$	160	mk/W
$R_{\theta j-c}$		$i = 2$	67	mk/W
$R_{\theta j-c}$		$i = 3$	20	mk/W
$R_{\theta j-c}$		$i = 4$	3	mk/W
$\tau_{th(j-c)D}$		$i = 1$	0,0382	s
$\tau_{th(j-c)D}$		$i = 2$	0,009	s
$\tau_{th(j-c)D}$		$i = 3$	0,0009	s
$\tau_{th(j-c)D}$		$i = 4$	0,005	s



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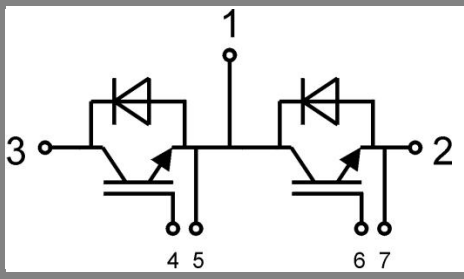
**GAL**







Case D 56



GB Case D 56



GAL Case D 57