

SKM 600GA176D



SEMITRANS® 4

Trench IGBT Modules

SKM 600GA176D

Preliminary Data

Features

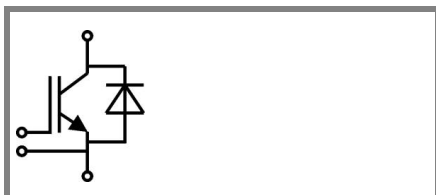
- Homogeneous Si
- Trench = Trenchgate technology
- $V_{CE(sat)}$ with positive temperature coefficient
- High short circuit capability, self limiting to $6 \times I_C$

Typical Applications

- AC inverter drives mains 575 - 790 V AC
- Public transport (auxiliary systems)

Remarks

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



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Absolute Maximum Ratings		$T_{case} = 25^\circ\text{C}$, unless otherwise specified			
Symbol	Conditions	Values			Units
IGBT					
V_{CES}	$T_j = 25^\circ\text{C}$	1700			V
I_C	$T_j = 150^\circ\text{C}$	$T_c = 25^\circ\text{C}$	660		A
		$T_c = 80^\circ\text{C}$	470		A
I_{CRM}	$I_{CRM} = 2 \times I_{Cnom}$	800			A
V_{GES}		± 20			V
t_{psc}	$V_{CC} = 1200$ V; $V_{GE} \leq 20$ V; $T_j = 125^\circ\text{C}$ $V_{CES} < 1700$ V	10			μs
Inverse Diode					
I_F	$T_j = 150^\circ\text{C}$	$T_c = 25^\circ\text{C}$	600		A
		$T_c = 80^\circ\text{C}$	410		A
I_{FRM}	$I_{FRM} = 2 \times I_{Fnom}$	800			A
I_{FSM}	$t_p = 10$ ms; sin.	$T_j = 150^\circ\text{C}$	3800		A
Module					
$I_{t(RMS)}$		500			A
T_{vj}		- 40 ... +150			$^\circ\text{C}$
T_{stg}		- 40 ... +125			$^\circ\text{C}$
V_{isol}	AC, 1 min.	4000			V

Characteristics		$T_{case} = 25^\circ\text{C}$, unless otherwise specified				
Symbol	Conditions	min.	typ.	max.	Units	
IGBT						
$V_{GE(th)}$	$V_{GE} = V_{CE}$, $I_C = 16$ mA	5,2	5,8	6,4	V	
I_{CES}	$V_{GE} = 0$ V, $V_{CE} = V_{CES}$		$T_j = 25^\circ\text{C}$ 0,2	$T_j = 125^\circ\text{C}$ 0,6	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}	$V_{GE} = 15$ V		$T_j = 25^\circ\text{C}$	2,5	3,1	m Ω
			$T_j = 125^\circ\text{C}$	3,9	4,5	m Ω
$V_{CE(sat)}$	$I_{Cnom} = 400$ A, $V_{GE} = 15$ V		$T_j = 25^\circ\text{C}_{chiplev.}$	2	2,45	V
			$T_j = 125^\circ\text{C}_{chiplev.}$	2,45	2,9	V
C_{res}	$V_{CE} = 25$, $V_{GE} = 0$ V	$f = 1$ MHz	28,4		nF	
C_{oes}			1,46		nF	
C_{res}			1,17		nF	
$t_{d(on)}$	$R_{Gon} = 3 \Omega$	$V_{CC} = 1200$ V $I_{Cnom} = 400$ A	290		ns	
t_r			70		ns	
E_{on}	$R_{Goff} = 3 \Omega$	$T_j = 125^\circ\text{C}$ $V_{GE} = \pm 15$ V	255		mJ	
$t_{d(off)}$			890		ns	
t_f			160		ns	
E_{off}			155		mJ	
$R_{th(j-c)}$	per IGBT	0,044			K/W	

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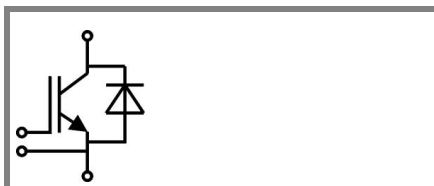
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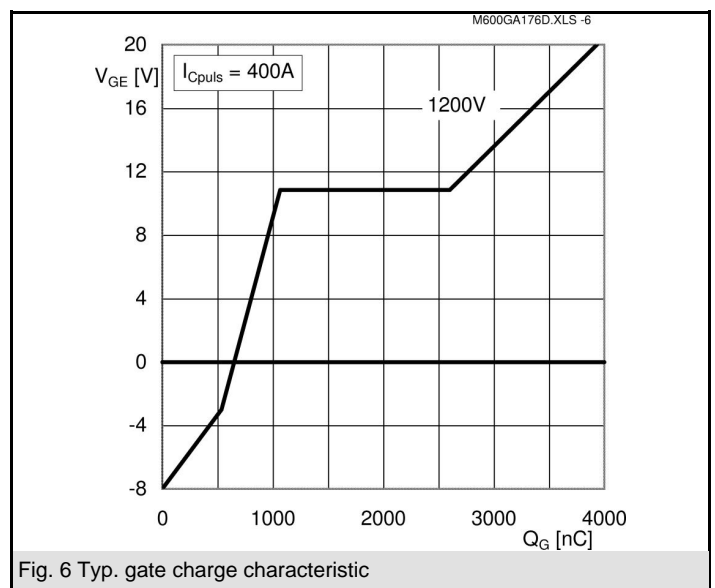
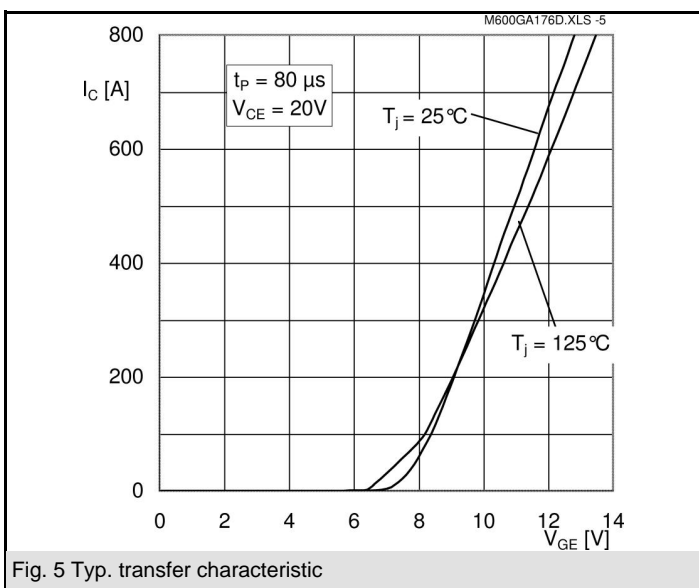
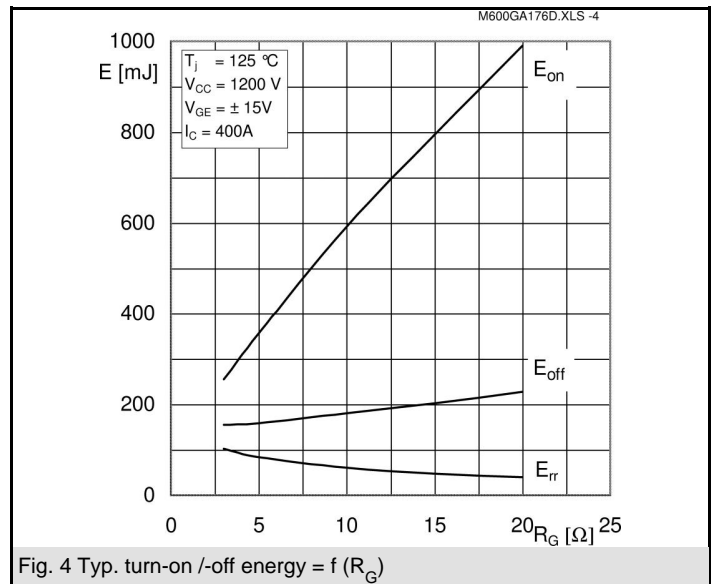
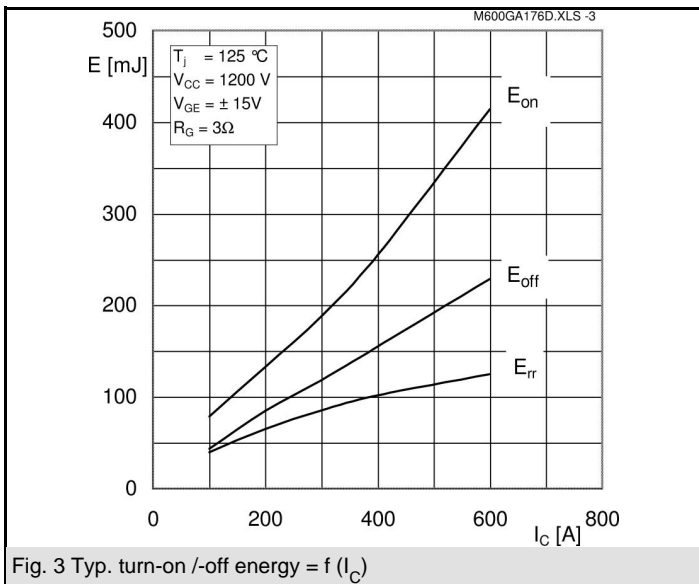
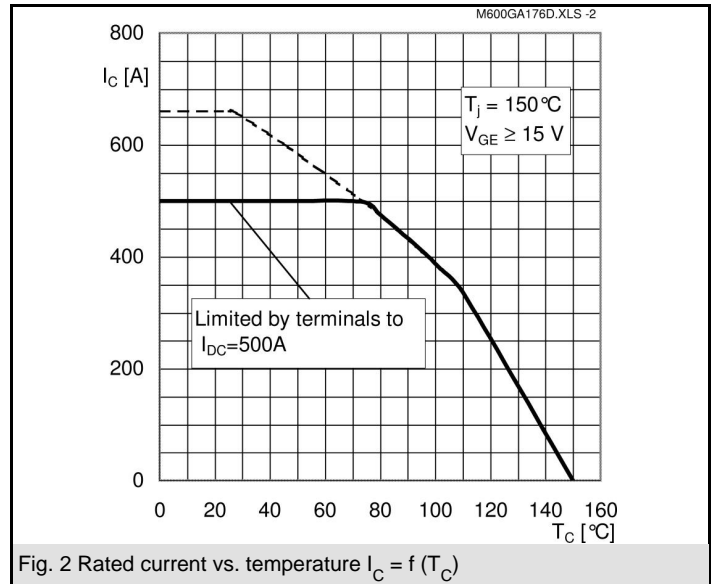
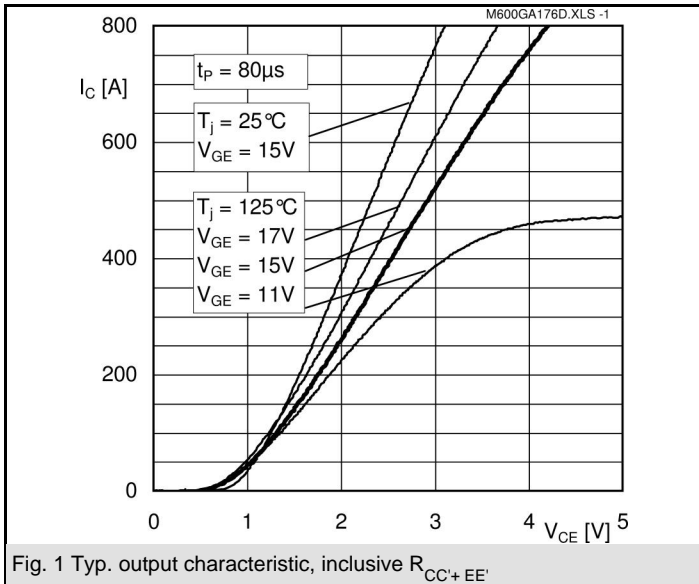
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Characteristics

Symbol	Conditions	min.	typ.	max.	Units
Inverse Diode					
$V_F = V_{EC}$	$I_{Fnom} = 400$ A; $V_{GE} = 0$ V	$T_j = 25^\circ\text{C}_{chiplev.}$	1,6	1,9	V
		$T_j = 125^\circ\text{C}_{chiplev.}$	1,6	1,9	V
V_{F0}			1,1	1,3	V
r_F			1,3	1,5	m Ω
I_{RRM}	$I_{Fnom} = 400$ A		510		A
Q_{rr}	$di/dt = 5700$ A/ μs		155		μC
E_{rr}	$V_{GE} = -15$ V; $V_{CC} = 1200$ V		102		mJ
$R_{th(j-c)D}$	per diode			0,09	K/W
Module					
L_{CE}			15	20	nH
R_{CC+EE}	res., terminal-chip	$T_{case} = 25^\circ\text{C}$	0,18		m Ω
		$T_{case} = 125^\circ\text{C}$	0,22		m Ω
$R_{th(c-s)}$	per module			0,038	K/W
M_s	to heat sink M6		3	5	Nm
M_t	to terminals M6 (M4)		2,5 (1,1)	5 (2)	Nm
w				330	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.



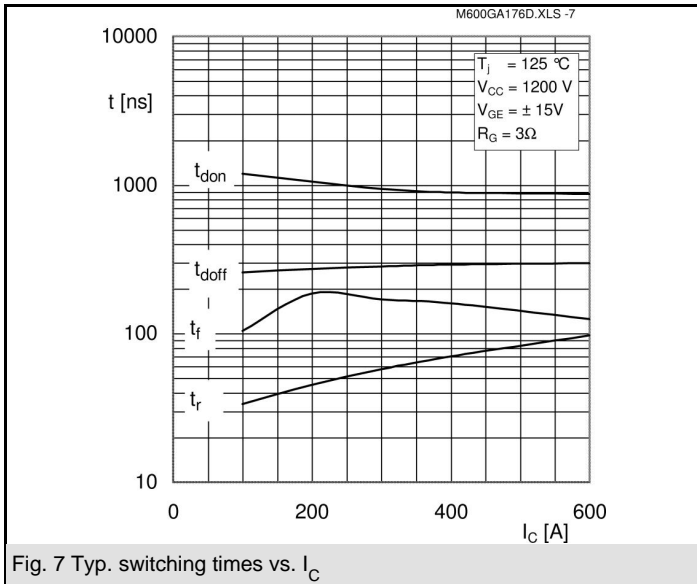


Fig. 7 Typ. switching times vs. I_C

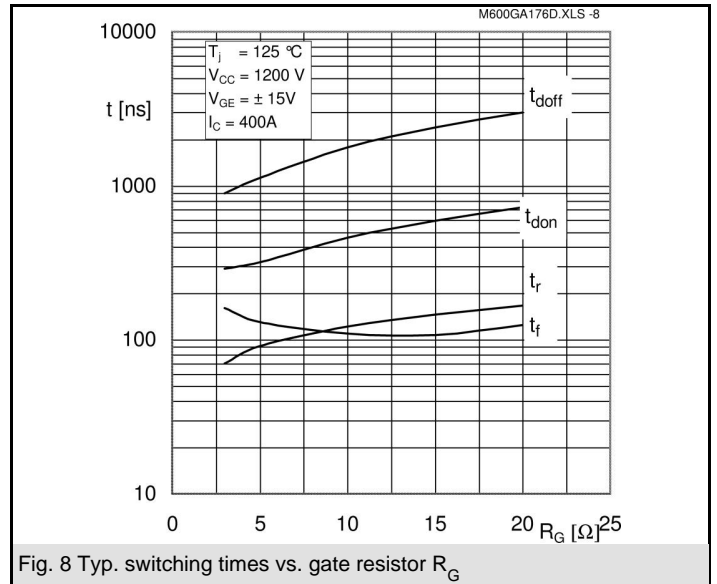


Fig. 8 Typ. switching times vs. gate resistor R_G

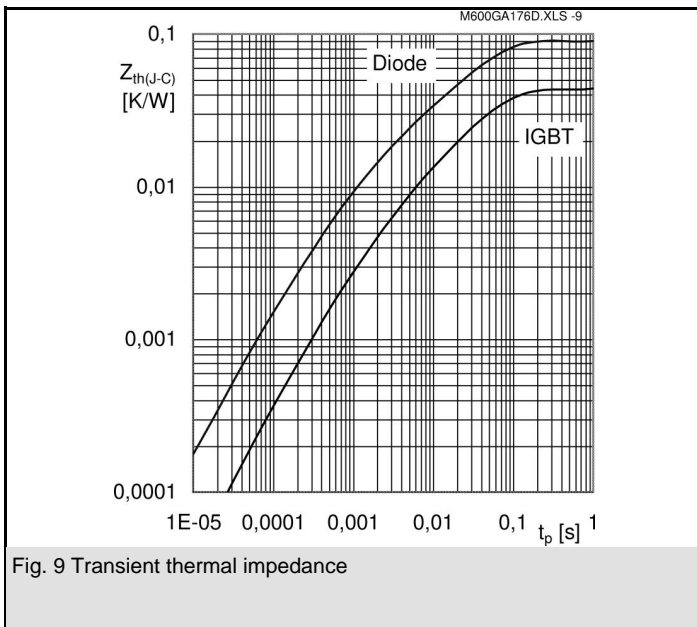


Fig. 9 Transient thermal impedance

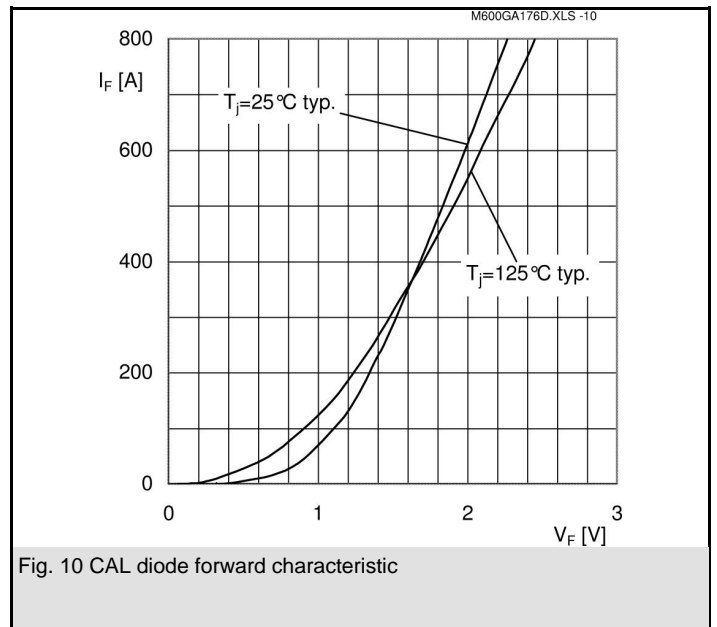


Fig. 10 CAL diode forward characteristic

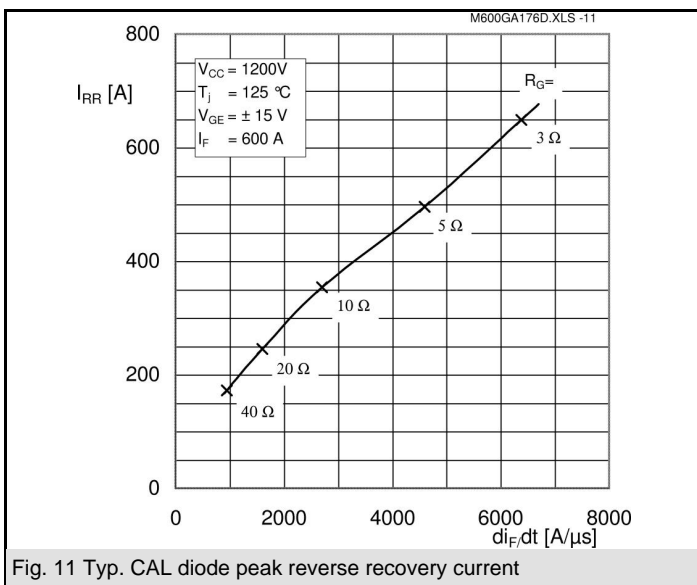


Fig. 11 Typ. CAL diode peak reverse recovery current

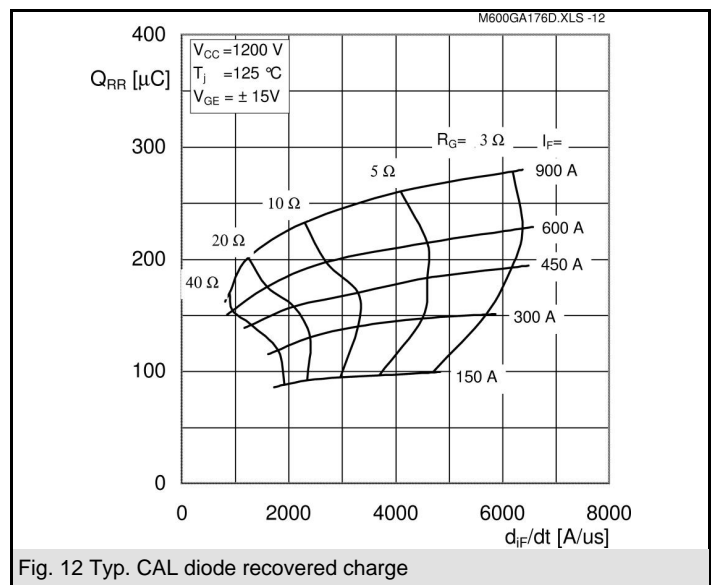


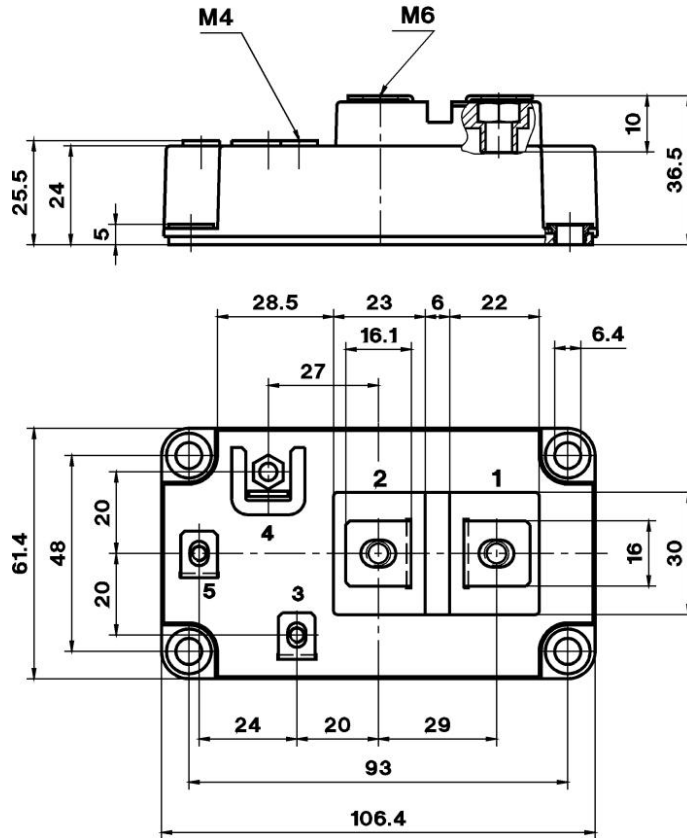
Fig. 12 Typ. CAL diode recovered charge

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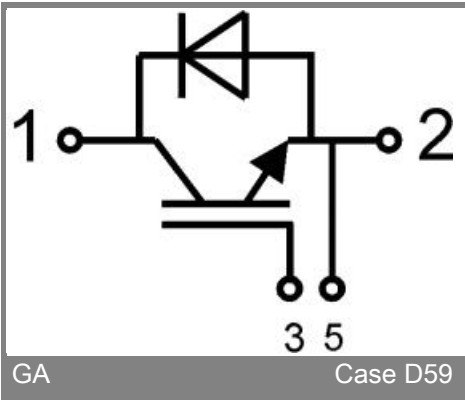
UL Recognized

CASED59

File no. 63 532



Case D 59



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Case D59