

1. General description

AC Thyristor power switch in a TO92 plastic package with self-protective capabilities against low and high energy transients

2. Features and benefits

- Exclusive negative gate triggering
- Full cycle AC conduction
- Very high noise immunity
- Remote gate separates the gate driver from the effects of the load current
- Safe clamping of low energy over-voltage transients
- Self-protective turn-on during high energy voltage transients
- High voltage capability

3. Applications

- Fan motor circuits
- Pump motor circuits
- Lower-power highly inductive, resistive and safety loads

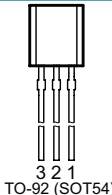
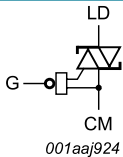
4. Quick reference data

Table 1. Quick reference data

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
Absolute maximum rating						
V_{DRM}	repetitive peak off-state voltage		-	-	800	V
$I_{T(RMS)}$	RMS on-state current	full sine wave; $T_{lead} \leq 75\text{ °C}$; Fig 1 ; Fig 2 ; Fig 3	-	-	0.8	A
Static characteristics						
I_{GT}	gate trigger current	$V_D = 12\text{ V}$; $I_T = 0.1\text{ A}$; LD+ G-; $T_J = 25\text{ °C}$; Fig. 8	1	-	10	mA
		$V_D = 12\text{ V}$; $I_T = 0.1\text{ A}$; LD- G+; $T_J = 25\text{ °C}$; Fig. 8	1	-	10	mA

5. Pinning information

Table 2. Pinning information

Pin	Symbol	Description	Simplified outline	Graphic symbol
1	CM	common	 TO-92 (SOT54)	 001aaj924
2	G	gate		
3	LD	load		

6. Ordering information

Table 3. Ordering information

Type number	Package Name	Orderable part number	Packing method	Small packing quantity	Package version	Package issue date
ACT108-800E	TO92	ACT108-800EEP	Bulk, 412	1000	SOT54 Straight lead	14-Nov-2013
ACT108-800E	TO92	ACT108-800EQP	Reel, 116	2000	SOT54 wide pitch	14-Nov-2013
ACT108-800E	TO92	ACT108-800EML	Ammo, 126	2000	SOT54 wide pitch	14-Nov-2013

7. Marking

Table 4. Marking codes

Type number	Marking codes
ACT108-800E	108-8E

8. Limiting values

Table 5. Limiting values

In accordance with the Absolute Maximum Rating System (IEC 60134).

Symbol	Parameter	Conditions	Min	Max	Unit
V_{DRM}	repetitive peak off-state voltage		-	800	V
$I_{\text{T(RMS)}}$	RMS on-state current	full sine wave; $T_{\text{lead}} \leq 75\text{ }^{\circ}\text{C}$; Fig 1 ; Fig 2 ; Fig 3	-	0.8	A
I_{TSM}	non-repetitive peak on-state current	full sine wave; $T_{\text{j(init)}} = 25\text{ }^{\circ}\text{C}$; $t_{\text{p}} = 20\text{ ms}$; Fig 4 ; Fig 5	-	13	A
		full sine wave; $T_{\text{j(init)}} = 25\text{ }^{\circ}\text{C}$; $t_{\text{p}} = 16.7\text{ ms}$	-	14.3	A
I^2t	I^2t for fusing	$t_{\text{p}} = 10\text{ ms}$; sine-wave pulse	-	0.84	A^2s
dI_{T}/dt	rate of rise of on-state current	$I_{\text{G}} = 20\text{ mA}$	-	100	$\text{A}/\mu\text{s}$
I_{GM}	peak gate current	$t_{\text{p}} = 20\text{ }\mu\text{s}$	-	1	A
V_{GM}	peak gate voltage	positive applied gate voltage	-	15	V
$P_{\text{G(AV)}}$	average gate power	over any 20ms period	-	0.1	W
T_{stg}	storage temperature		-40	150	$^{\circ}\text{C}$
T_{j}	junction temperature		-	125	$^{\circ}\text{C}$
V_{PP}	peak pulse voltage	$T_{\text{j}} = 25\text{ }^{\circ}\text{C}$; non-repetitive, off-state; ten pulses on each voltage polarity; 20s or more between successive pulses; Fig 6	-	2.5	kV

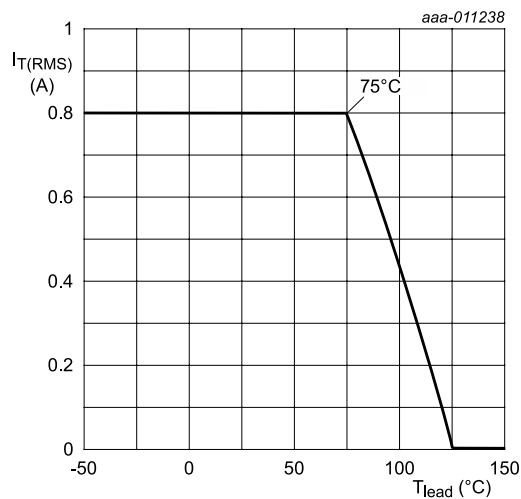
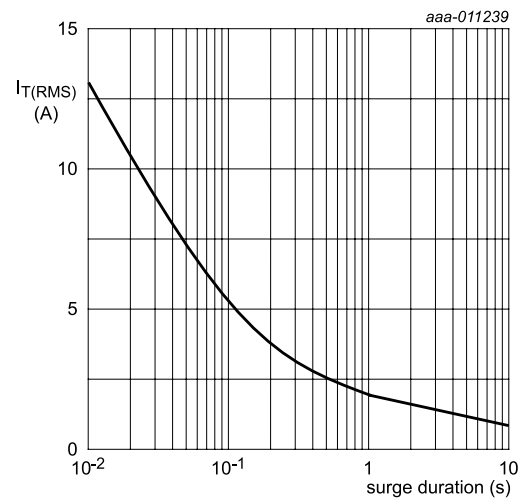


Fig. 1. RMS on-state current as a function of lead temperature; maximum values



$f = 50\text{ Hz}$; $T_{\text{lead}} = 75\text{ }^{\circ}\text{C}$

Fig. 2. RMS on-state current as a function of surge duration; maximum values

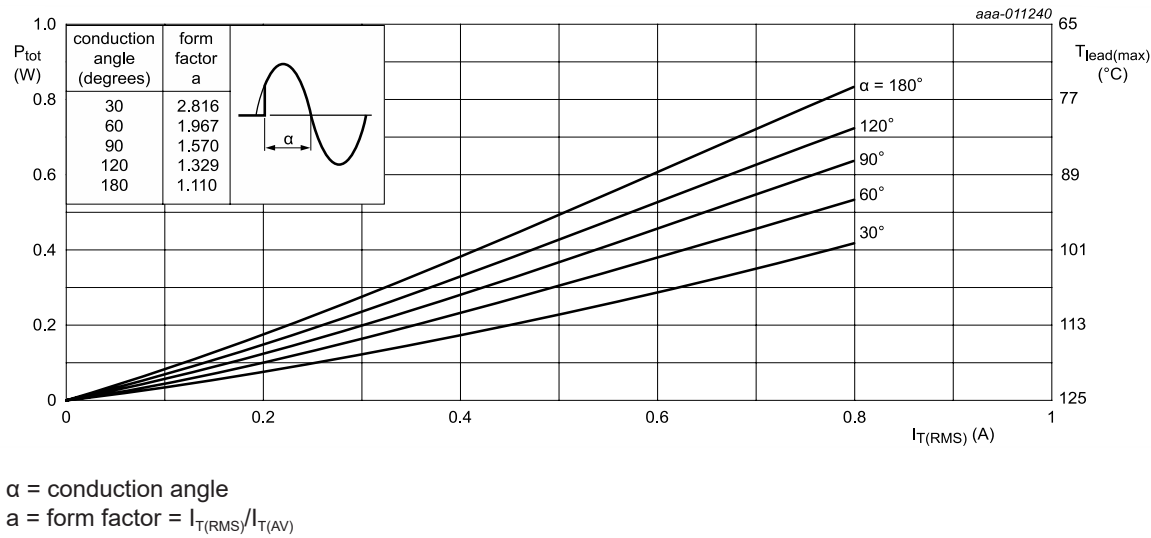


Fig. 3. Total power dissipation as a function of RMS on-state current; maximum values

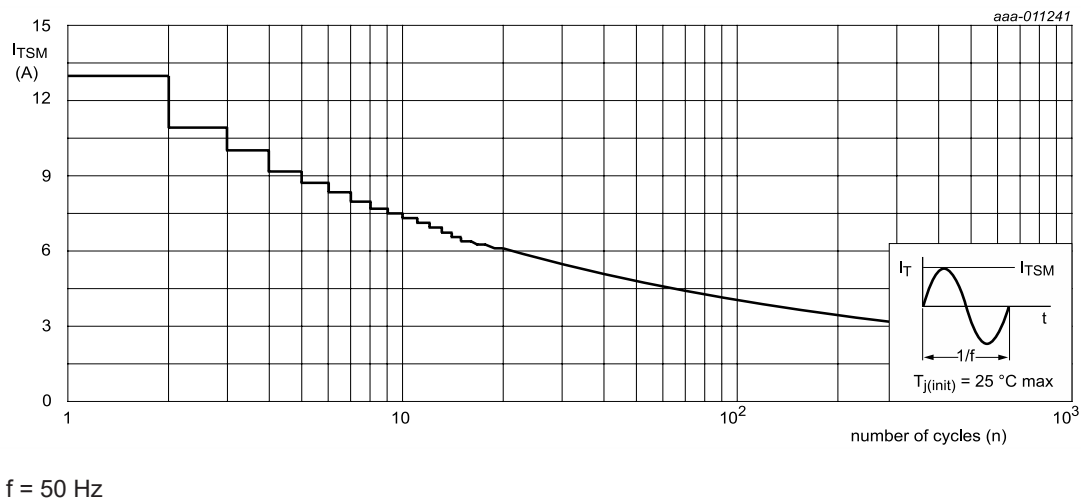
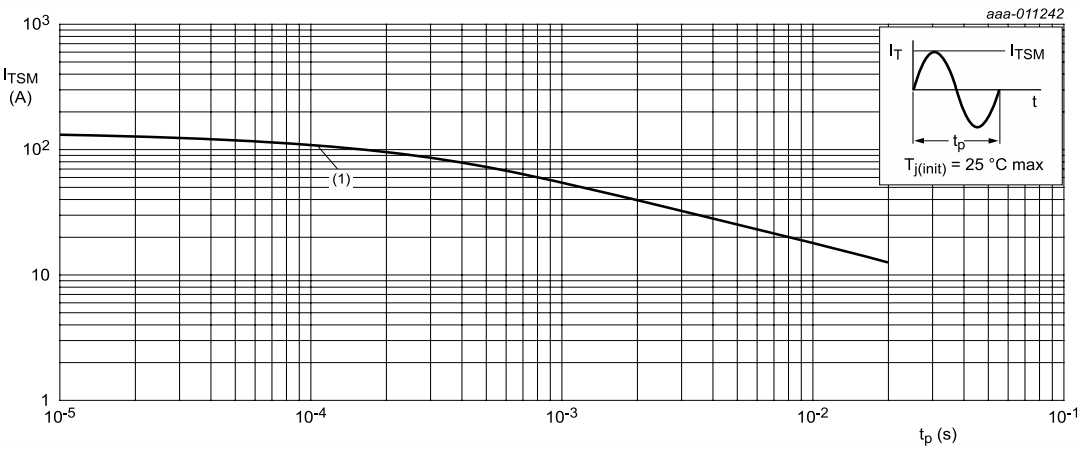


Fig. 4. Non-repetitive peak on-state current as a function of the number of sinusoidal current cycles; maximum values



$t_p \leq 20\text{ ms}$
(1) di_T/dt limit

Fig. 5. Non-repetitive peak on-state current as a function of pulse width; maximum values

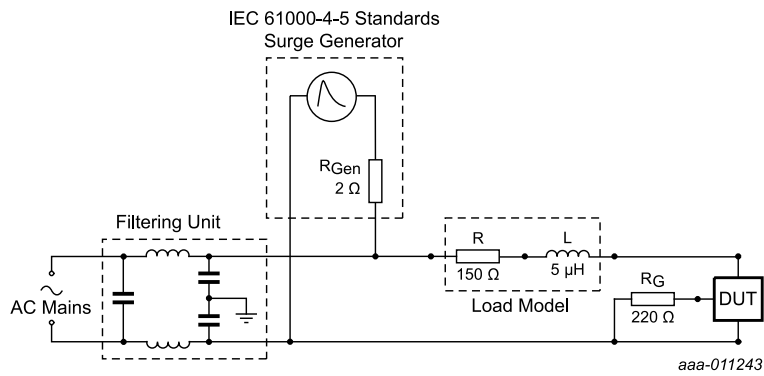
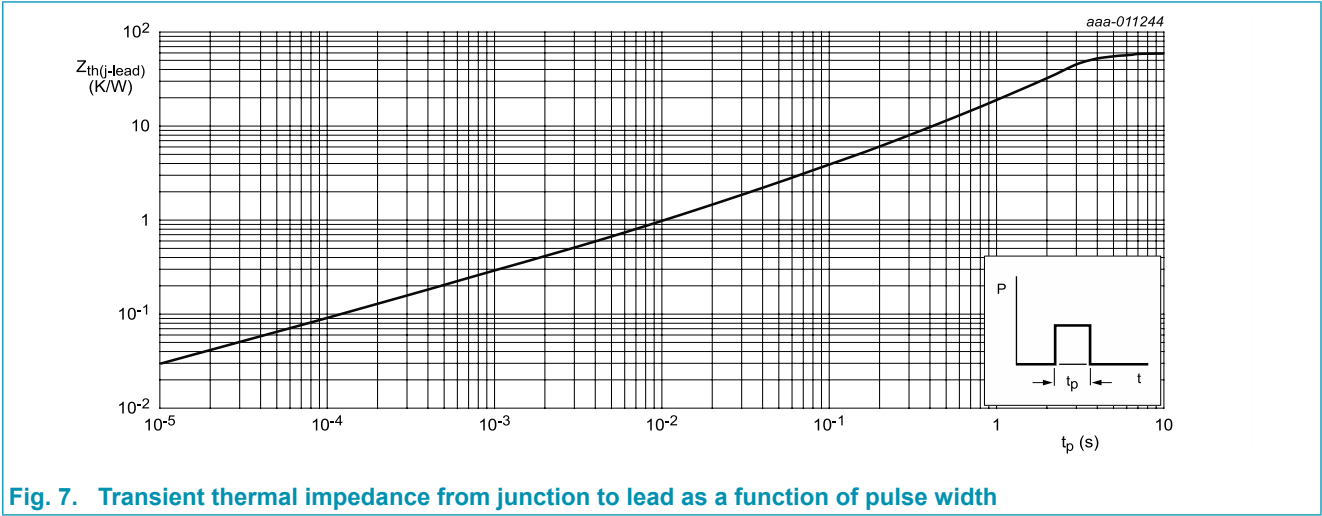


Fig. 6. Test circuit for inductive and resistive loads with conditions equivalent to IEC 61000-4-5

9. Thermal characteristics

Table 6. Thermal characteristics

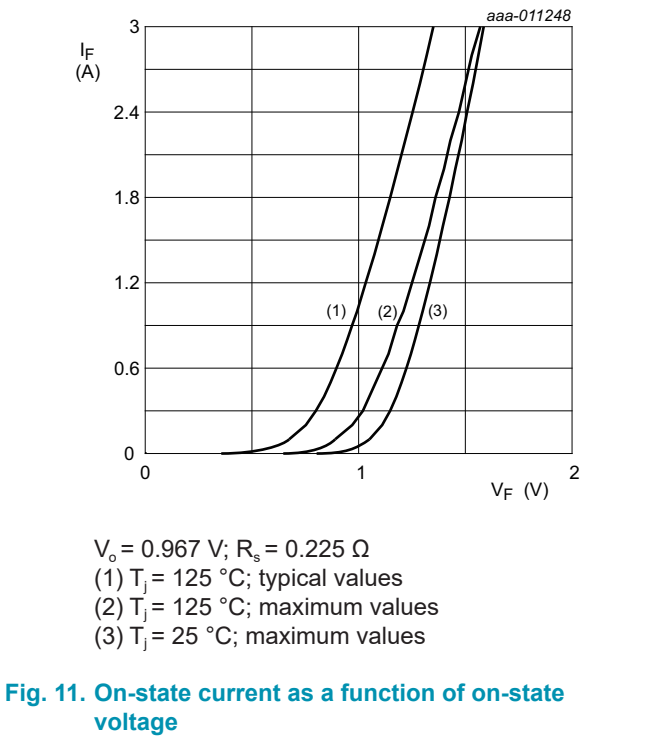
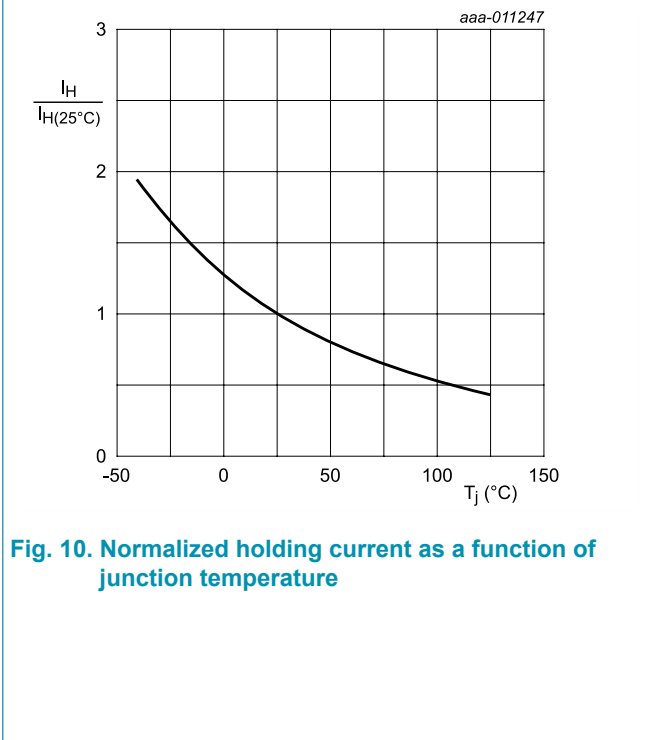
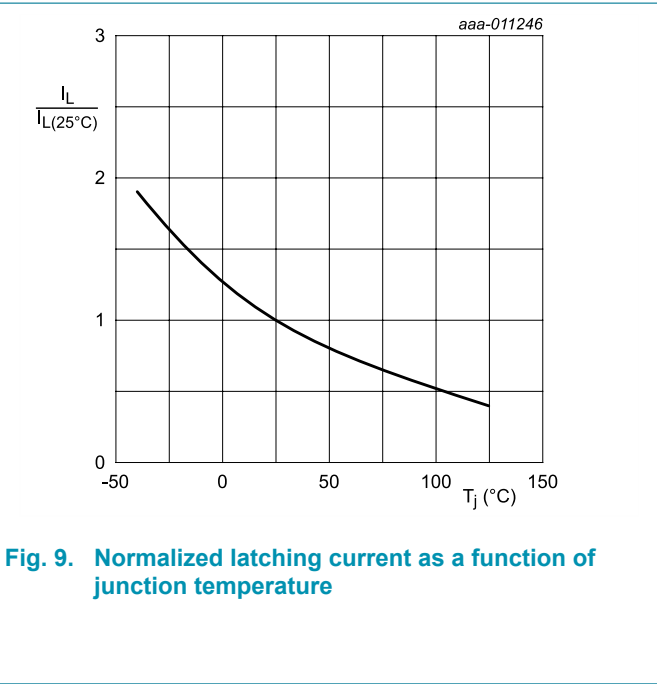
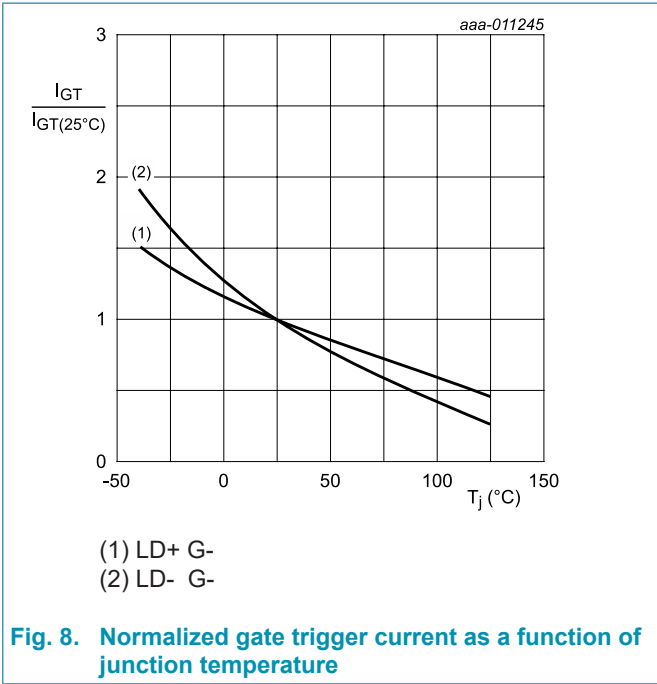
Symbol	Parameter	Conditions	Min	Typ	Max	Unit
$R_{th(j-lead)}$	thermal resistance from junction to lead	full cycle with heatsink compound; Fig. 7	-	-	60	K/W
$R_{th(j-a)}$	thermal resistance from junction to ambient free air	full cycle; printed-circuit board mounted; lead length 4mm	-	150	-	K/W



10. Characteristics

Table 7. Characteristics

Symbol	Parameter	Conditions		Min	Typ	Max	Unit
Static characteristics							
I_{GT}	gate trigger current	$V_D = 12\text{ V}$; $I_T = 0.1\text{ A}$; LD+ G-; $T_J = 25\text{ }^\circ\text{C}$; Fig. 8		1	-	10	mA
		$V_D = 12\text{ V}$; $I_T = 0.1\text{ A}$; LD- G-; $T_J = 25\text{ }^\circ\text{C}$; Fig. 8		1	-	10	mA
I_L	latching current	$V_D = 12\text{ V}$; $I_G = 0.1\text{ A}$; LD+ G-; $T_J = 25\text{ }^\circ\text{C}$; Fig. 9		-	-	25	mA
		$V_D = 12\text{ V}$; $I_G = 0.1\text{ A}$; LD- G-; $T_J = 25\text{ }^\circ\text{C}$; Fig. 9		-	-	20	mA
I_H	holding current	$V_D = 12\text{ V}$; $T_J = 25\text{ }^\circ\text{C}$; Fig. 10		-	-	20	mA
V_T	on-state voltage	$I_T = 1.1\text{ A}$; $T_J = 25\text{ }^\circ\text{C}$; Fig. 11		-	-	1.3	V
V_{GT}	gate trigger voltage	$V_D = 12\text{ V}$; $I_T = 0.1\text{ A}$; $T_J = 25\text{ }^\circ\text{C}$; Fig. 12		-	-	1	V
		$V_D = 400\text{ V}$; $I_T = 0.1\text{ A}$; $T_J = 125\text{ }^\circ\text{C}$		0.15	-	-	V
I_D	off-state current	$V_D = 800\text{ V}$; $T_J = 25\text{ }^\circ\text{C}$		-	-	2	uA
		$V_D = 800\text{ V}$; $T_J = 125\text{ }^\circ\text{C}$		-	-	0.2	mA
V_{CL}	clamping voltage	$I_{CL} = 0.1\text{ mA}$; $t_p = 1\text{ ms}$; $T_J \leq 25\text{ }^\circ\text{C}$;		850	-	-	V
Dynamic characteristics							
dV_D/dt	rate of rise of off-state voltage	$V_{DM} = 536\text{ V}$; $T_J = 125\text{ }^\circ\text{C}$; ($V_{DM} = 67\%$ of V_{DRM}); exponential waveform; gate open circuit; Fig. 13		500	-	-	V/ μs
dI_{com}/dt	rate of change of commutating current	$V_D = 400\text{ V}$; $T_J = 125\text{ }^\circ\text{C}$; $I_{T(RMS)} = 0.8\text{ A}$; $dV_{com}/dt = 20\text{ V}/\mu\text{s}$; (snubberless condition); gate open circuit; Fig. 14 ; Fig. 15		0.5	-	-	A/ms



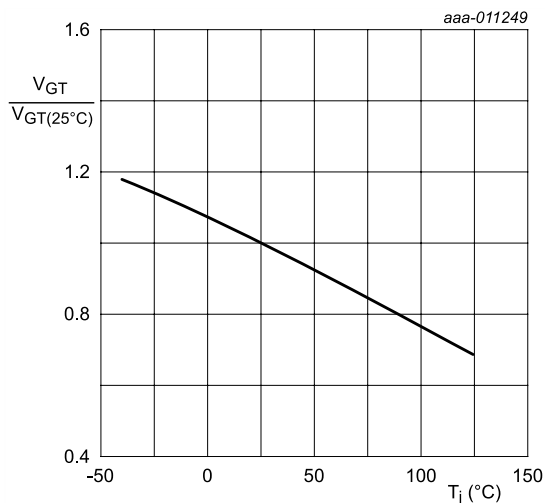
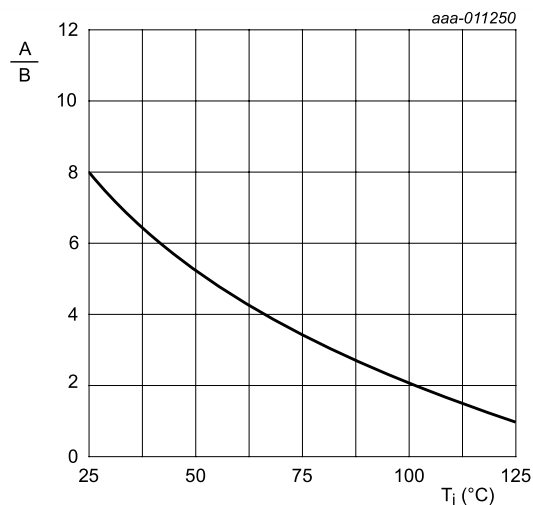
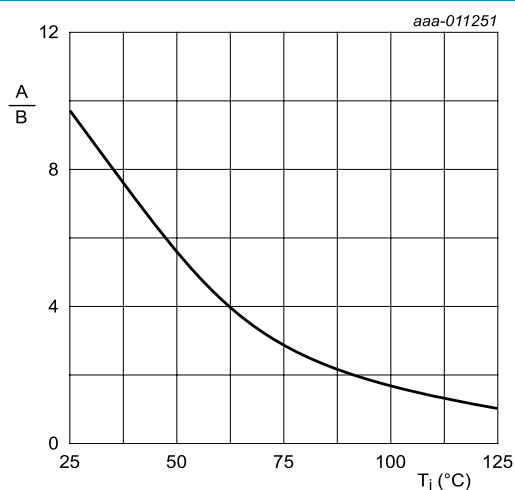


Fig. 12. Normalized gate trigger voltage as a function of junction temperature



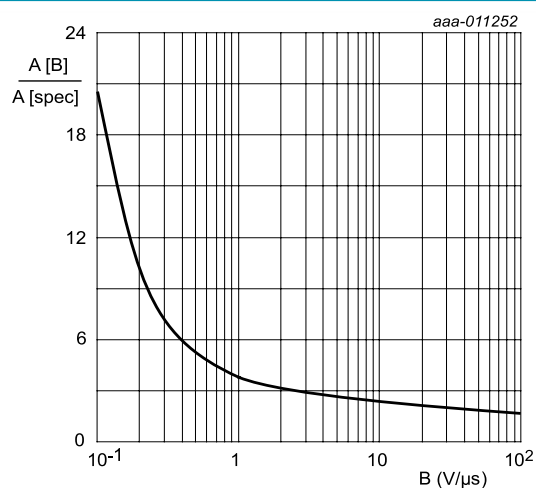
$A = dV_D/dt$ at condition T_j °C
 $B = dV_D/dt$ at condition $T_j [125]$ °C

Fig. 13. Normalized rate of rise of off-state voltage as a function of junction temperature



$A = dI_{com}/dt$ at condition T_j °C
 $B = dI_{com}/dt$ at condition $T_j [125]$ °C
 $V_D = 400$ V

Fig. 14. Normalized critical rate of rise of commutating current as a function of junction temperature

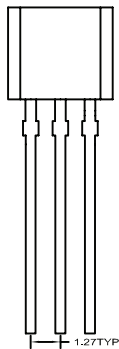


$A [B] = dI_{com}/dt$ at condition $B, dV_{com}/dt$
 $A [spec]$ is the data sheet value for dI_{com}/dt
 turn-off time is less than 20 ms

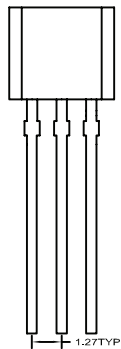
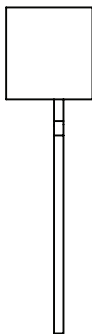
Fig. 15. Normalized critical rate of change of commutating current as a function of critical rate of change of commutating voltage; minimum values

11. Package outline

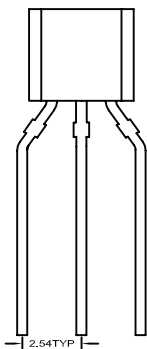
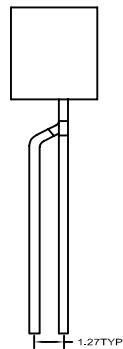
SOT54 PACKAGE OUTLINE



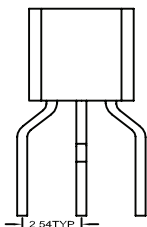
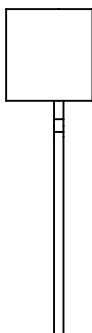
SOT54
Bulk Pack - 412



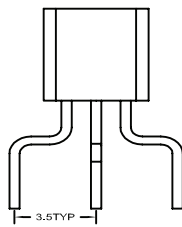
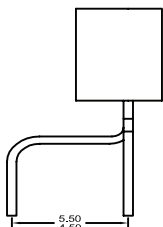
SOT54 LEADS ON CIRCLE
Bulk Pack - 112



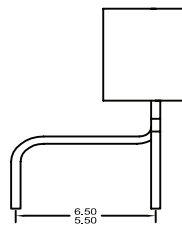
SOT54 WIDE PITCH
Tape/ Reel Pack - 116
Ammo Pack - 126



SOT54 LEAD BEND L01
Bulk Pack - 412



SOT54 LEAD BEND L02
Bulk Pack - 412



Remark: Detailed dimensions refer to POD drawing.

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Objective [short] data sheet	Development	This document contains data from the objective specification for product development.
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