

1. General description

AC Thyristor power switch in a SOT54 plastic package with self-protective capabilities against low and high energy transients

2. Features and benefits

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

3. Applications

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

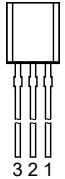
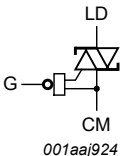
4. Quick reference data

Table 1. Quick reference data

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
V_{DRM}	repetitive peak off-state voltage		-	-	600	V
$I_{T(RMS)}$	RMS on-state current	full sine wave; $T_{lead} \leq 71 \text{ }^\circ\text{C}$; Fig. 1	-	-	0.8	A
Static characteristics						
I_{GT}	gate trigger current	$V_D = 12 \text{ V}$; $I_T = 100 \text{ mA}$; LD+ G-; $T_j = 25 \text{ }^\circ\text{C}$; Fig. 6	0.5	-	5	mA
		$V_D = 12 \text{ V}$; $I_T = 100 \text{ mA}$; LD- G-; $T_j = 25 \text{ }^\circ\text{C}$; Fig. 6	0.5	-	5	mA

5. Pinning information

Table 2. Pinning information

Pin	Symbol	Description	Simplified outline	Graphic symbol
1	CM	common	 <p>TO-92 (SOT54)</p>	 <p>001aa924</p>
2	G	gate		
3	LD	load		

6. Ordering information

Table 3. Ordering information

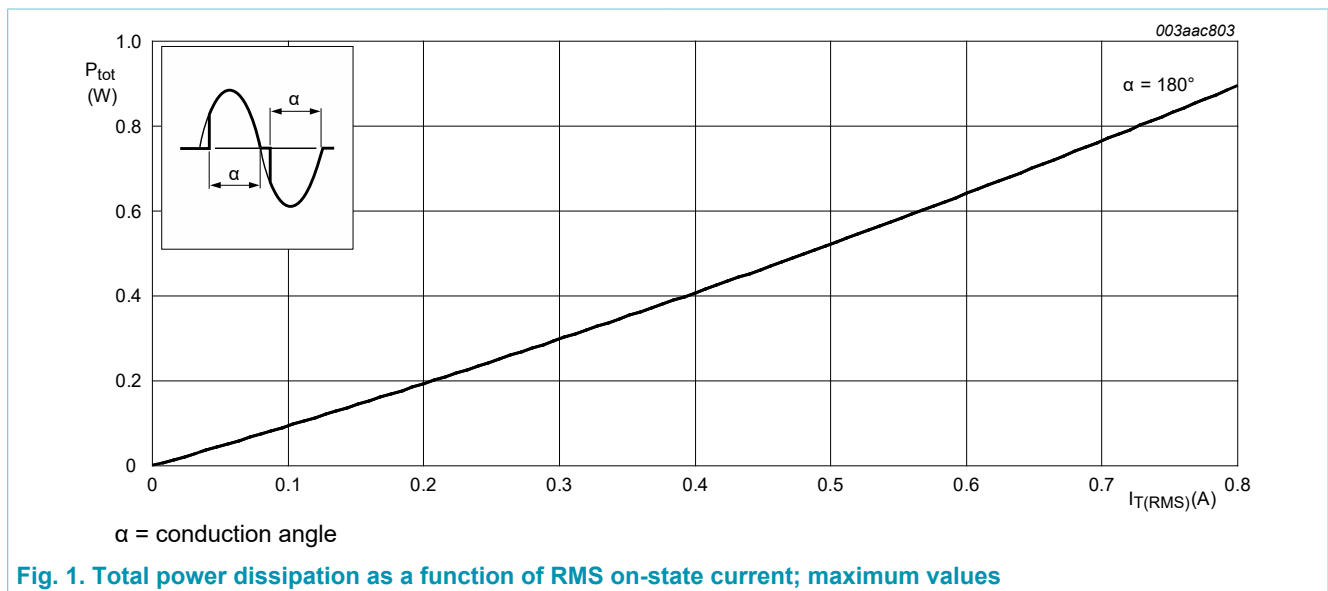
Type number	Package		
	Name	Description	Version
ACT108-600D	TO-92	plastic single-ended leaded (through hole) package; 3 leads	SOT54
ACT108-600D/DG	TO-92	plastic single-ended leaded (through hole) package; 3 leads	SOT54

7. Limiting values

Table 4. 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		-	600	V
$I_{T(RMS)}$	RMS on-state current	full sine wave; $T_{lead} \leq 71\text{ °C}$; Fig. 1	-	0.8	A
I_{TSM}	non-repetitive peak on-state current	full sine wave; $T_{j(init)} = 25\text{ °C}$; $t_p = 16.7\text{ ms}$	-	8.8	A
		full sine wave; $T_{j(init)} = 25\text{ °C}$; $t_p = 20\text{ ms}$; Fig. 2 ; Fig. 3	-	8	A
I^2t	I^2t for fusing	$t_p = 10\text{ ms}$; SIN	-	0.32	A ² s
di_T/dt	rate of rise of on-state current	$I_G = 10\text{ mA}$	-	50	A/ μ s
I_{GM}	peak gate current	$t = 20\text{ }\mu$ s	-	1	A
V_{GM}	peak gate voltage		-	15	V
$P_{G(AV)}$	average gate power	over any 20 ms period	-	0.1	W
T_{stg}	storage temperature		-40	150	°C
T_j	junction temperature		-	125	°C
V_{PP}	peak pulse voltage	$T_j = 25\text{ °C}$; non-repetitive, off-state; Fig. 4	-	2	kV



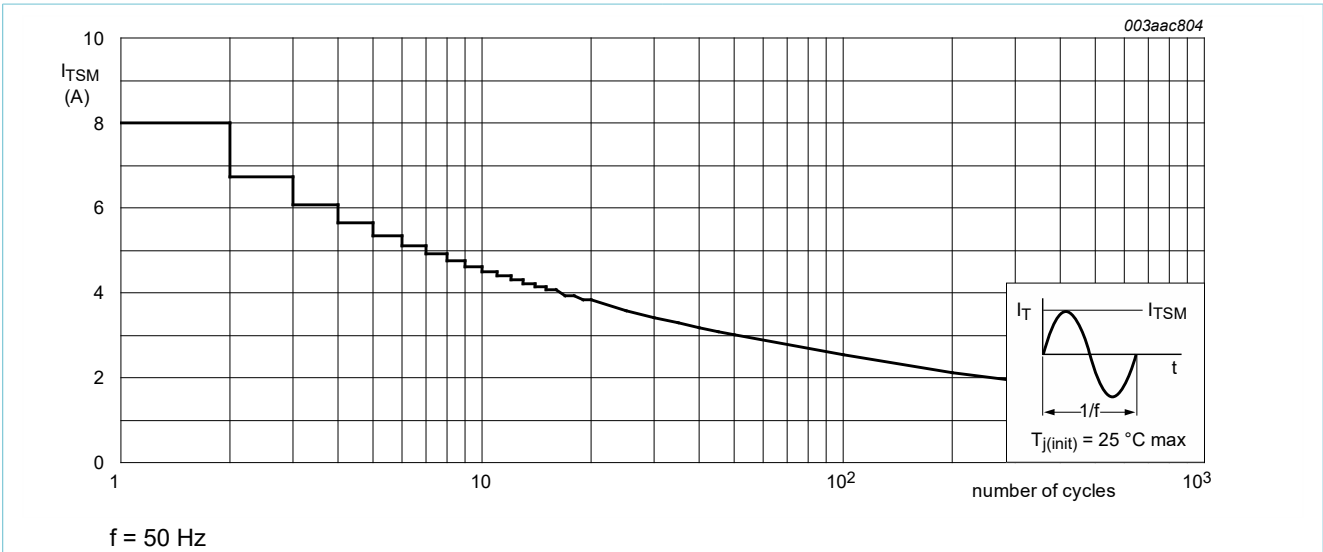


Fig. 2. Non-repetitive peak on-state current as a function of the number of sinusoidal current cycles; maximum values

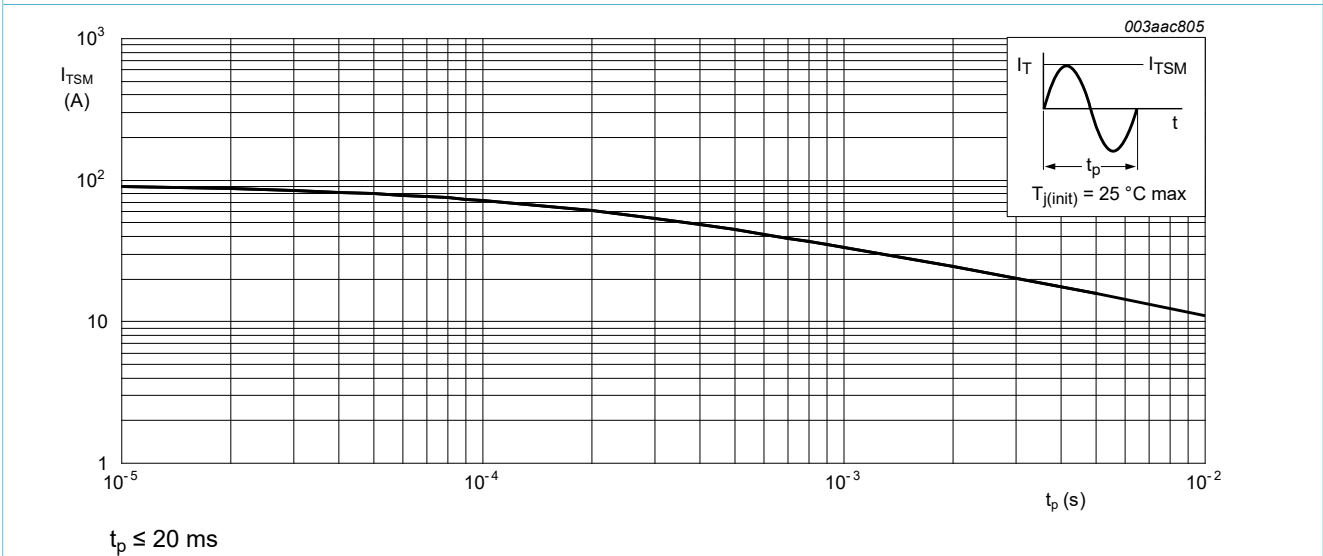


Fig. 3. Non-repetitive peak on-state current as a function of pulse width; maximum values

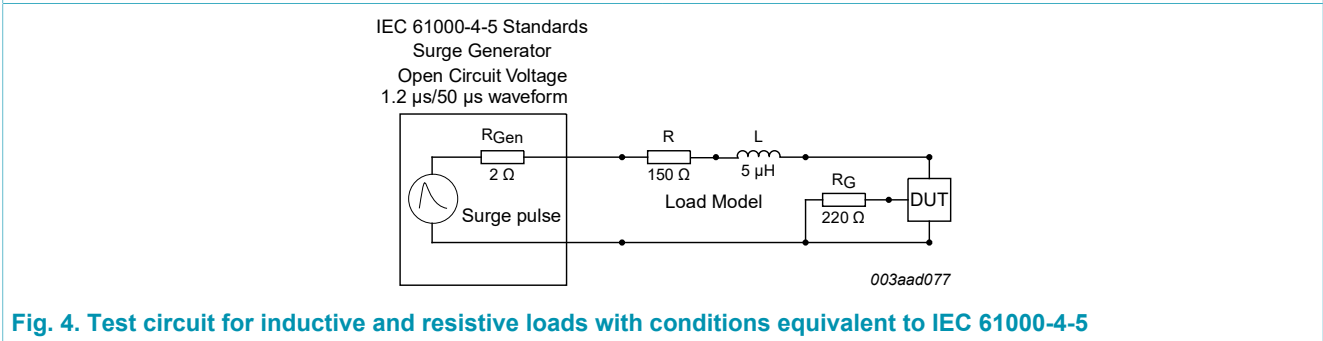


Fig. 4. Test circuit for inductive and resistive loads with conditions equivalent to IEC 61000-4-5

8. Thermal characteristics

Table 5. 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. 5	-	-	60	K/W
$R_{th(j-a)}$	thermal resistance from junction to ambient free air	full cycle; printed-circuit board mounted; lead length 4 mm	-	150	-	K/W

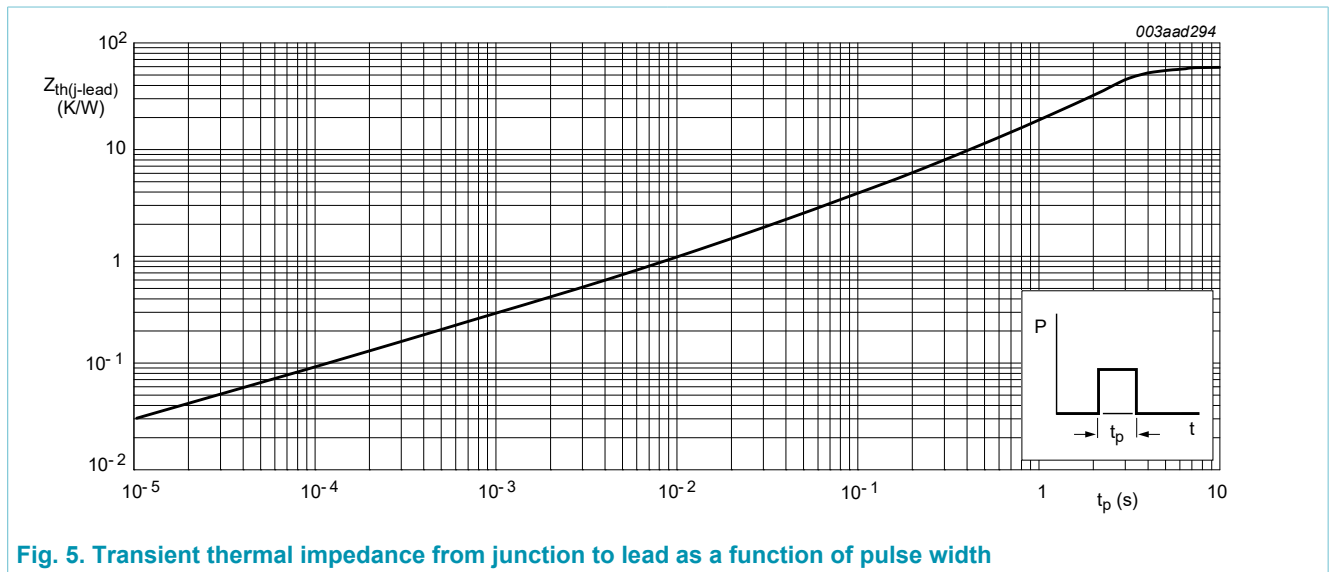


Fig. 5. Transient thermal impedance from junction to lead as a function of pulse width

9. Characteristics

Table 6. Characteristics

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
Static characteristics						
I _{GT}	gate trigger current	V _D = 12 V; I _T = 100 mA; LD+ G-; T _j = 25 °C; Fig. 6	0.5	-	5	mA
		V _D = 12 V; I _T = 100 mA; LD- G-; T _j = 25 °C; Fig. 6	0.5	-	5	mA
I _L	latching current	V _D = 12 V; I _G = 100 mA; LD+ G-; T _j = 25 °C; Fig. 7	-	-	25	mA
		V _D = 12 V; I _G = 100 mA; LD- G-; T _j = 25 °C; Fig. 7	-	-	25	mA
I _H	holding current	V _D = 12 V; T _j = 25 °C; Fig. 8	-	-	20	mA
V _T	on-state voltage	I _T = 1.1 A; T _j = 25 °C; Fig. 9	-	-	1.3	V
V _{GT}	gate trigger voltage	V _D = 400 V; I _T = 100 mA; T _j = 125 °C	0.15	-	-	V
		V _D = 12 V; I _T = 100 mA; T _j = 25 °C	-	-	0.9	V
I _D	off-state current	V _D = 600 V; T _j = 25 °C	-	-	2	μA
		V _D = 600 V; T _j = 125 °C	-	-	0.2	mA
V _{CL}	clamping voltage	I _{CL} = 0.1 mA; t _p = 1 ms; T _j ≤ 125 °C	650	-	-	V
Dynamic characteristics						
dV _D /dt	rate of rise of off-state voltage	V _{DM} = 402 V; T _j = 125 °C; (V _{DM} = 67% of V _{DRM}); exponential waveform; gate open circuit; Fig. 10	300	-	-	V/μs
di _{com} /dt	rate of change of commutating current	V _D = 400 V; T _j = 125 °C; I _{T(RMS)} = 1 A; dV _{com} /dt = 15 V/μs; gate open circuit; Fig. 11; Fig. 12	0.15	-	-	A/ms

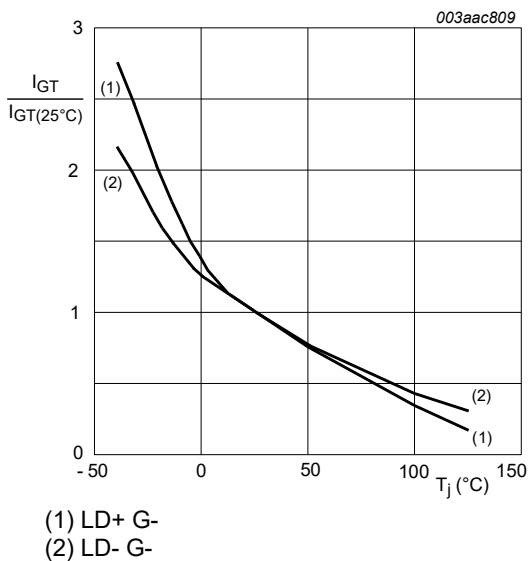


Fig. 6. Normalized gate trigger current as a function of junction temperature

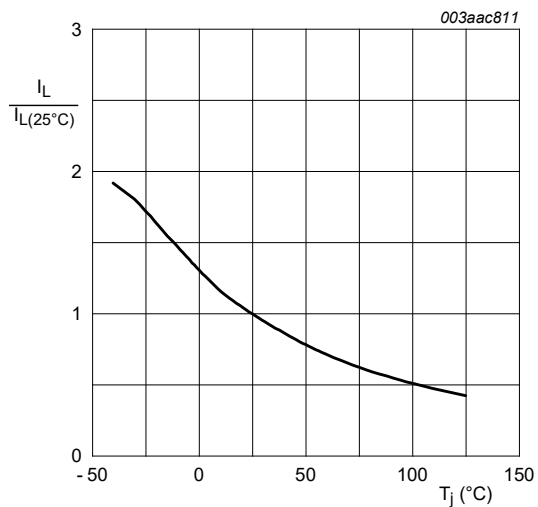


Fig. 7. Normalized latching current as a function of junction temperature

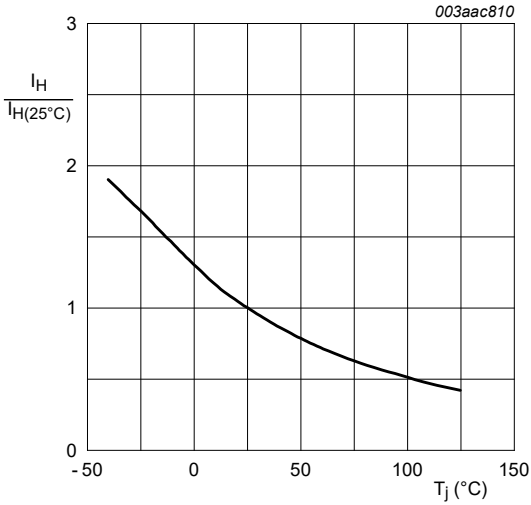
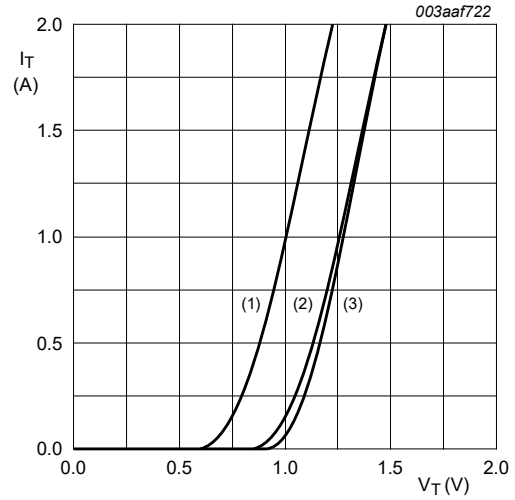


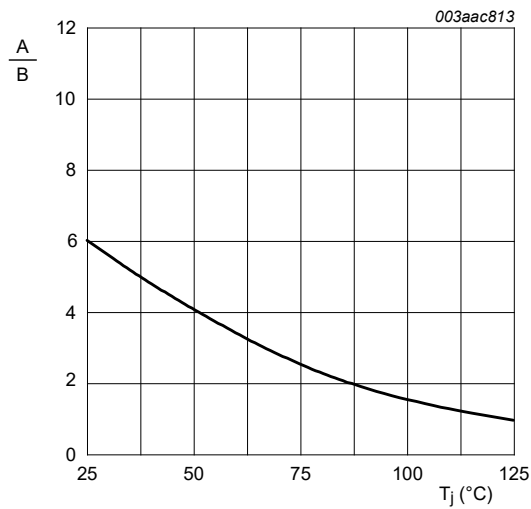
Fig. 8. Normalized holding current as a function of junction temperature



$V_o = 0.758 \text{ V}; R_s = 0.263 \Omega$

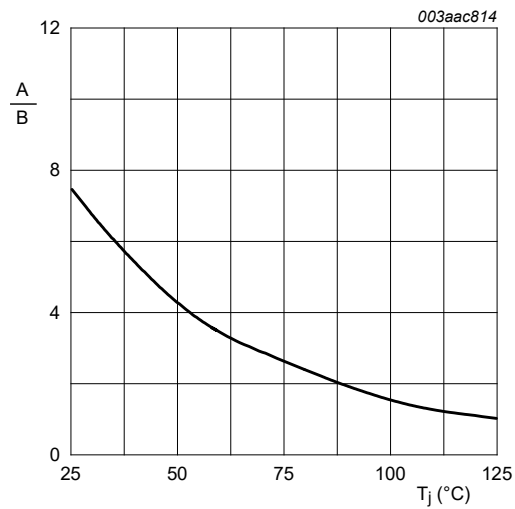
- (1) $T_j = 125 \text{ }^\circ\text{C}$; typical values
- (2) $T_j = 125 \text{ }^\circ\text{C}$; maximum values
- (3) $T_j = 25 \text{ }^\circ\text{C}$; maximum values

Fig. 9. On-state current as a function of on-state voltage



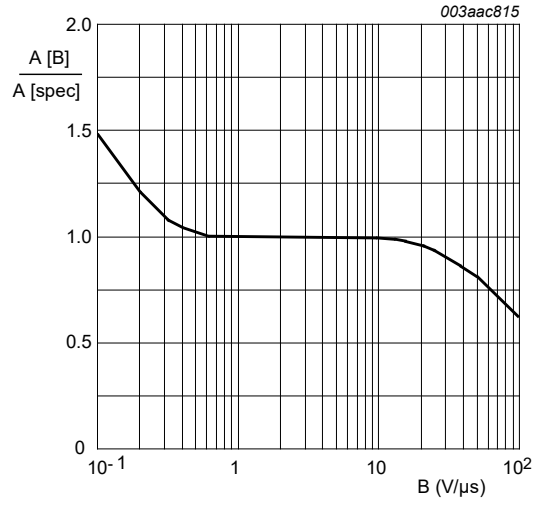
$A = dV_D/dt$ at condition $T_j \text{ }^\circ\text{C}$
 $B = dV_D/dt$ at condition $T_j [125] \text{ }^\circ\text{C}$

Fig. 10. Normalized rate of rise of off-state voltage as a function of junction temperature



$A = di_{com}/dt$ at condition $T_j \text{ }^\circ\text{C}$
 $B = di_{com}/dt$ at condition $T_j [125] \text{ }^\circ\text{C}$
 $V_D = 400 \text{ V}$

Fig. 11. Normalized critical rate of rise of commutating current as a function of junction temperature



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

Fig. 12. Normalized critical rate of change of commutating current as a function of critical rate of change of commutating voltage; minimum values

10. Package outline

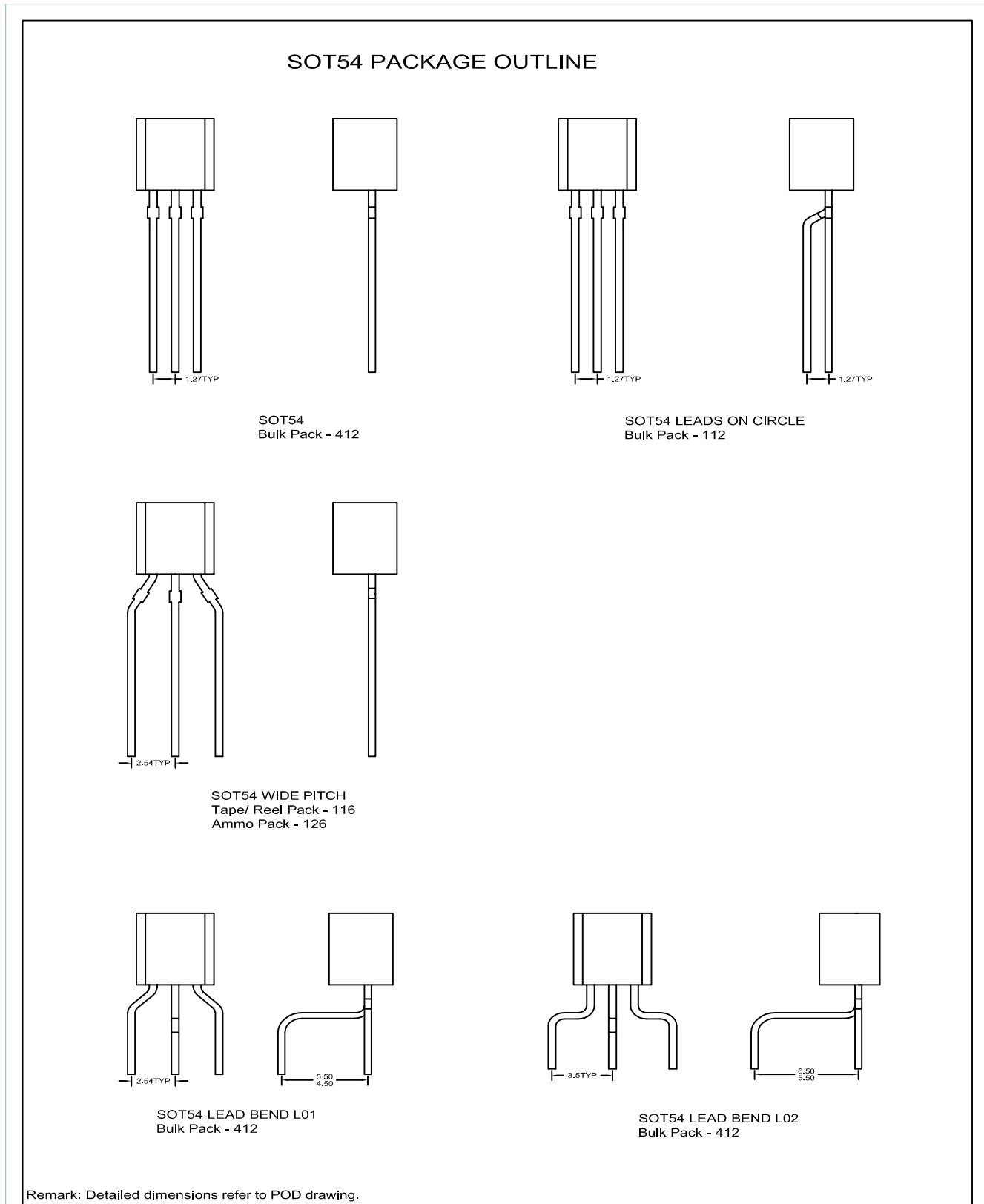


Fig. 13. Package outline TO-92 (SOT54)

11. Legal information

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Document status [1][2]	Product status [3]	Definition
Objective [short] data sheet	Development	This document contains data from the objective specification for product development.
Preliminary [short] data sheet	Qualification	This document contains data from the preliminary specification.
Product [short] data sheet	Production	This document contains the product specification.

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- [2] The term 'short data sheet' is explained in section "Definitions".
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