



Nanosecond SCR Switch

DESCRIPTION

The UPGA301Ae3 is designed for high current narrow-pulse switching applications where size and current handling capability are critical. These devices may be triggered on using low power logic drivers from (+0.8 V at 200 μ A). Epoxy packaged, oxide passivated planar SCR chips with metallurgic bonds on both sides to achieve high reliability. Internal wire bond connection allows high current surge capability for narrow pulse applications.

Important: For the latest information, visit our website <http://www.microsemi.com>.

FEATURES

- Low thermal resistance package for higher current operation
- High speed switching capability
- Efficient heat path with Integral locking bottom metal tab
- Full metallic bottom eliminates flux entrapment
- Compatible with automatic insertion equipment
- Low profile-maximum height of 1mm
- RoHS compliant

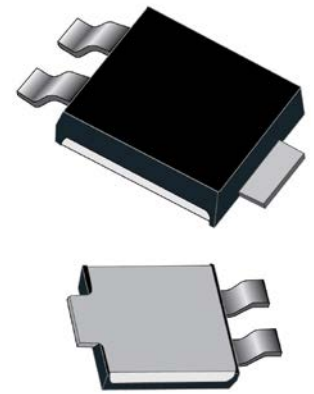
APPLICATIONS / BENEFITS

- Reference Microsemi MicroNote [601](#) and [602](#)
- Nanosecond SCR switch for reliable high current pulse generators, modulators and photo-flash quenching
- Logic drive capability (0.8 V, 200 μ A)
- Ideal for laser range finder and camera applications
- Ideal for automotive collision avoidance applications
- Small 8.45 mm² foot print (See [mounting pad](#) details)

MAXIMUM RATINGS @ 25 °C unless otherwise specified

Parameters/Test Conditions	Symbol	Value	Unit
Storage Temperature	T _{STG}	-50 to +150	°C
Junction Temperature	T _J	0 to +125	°C
Thermal Resistance Junction-to-Case	R _{θJC}	4.0	°C/W
Thermal Resistance Junction-to-Ambient ⁽¹⁾	R _{θJA}	65	°C/W
Repetitive Peak Off-State Voltage	V _{DRM}	100	V
Peak On-State Current for 50 ns (max)	I _{TSM}	100	A
Peak Gate Current	I _{GM}	250	mA
Reverse Gate Voltage	V _{GR}	5	V
Solder Temperature @ 10 s	T _{SP}	260	°C

Notes: 1. When mounted on 0.06" thick FR-4PC board using 2 oz copper with recommended minimum foot print



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MECHANICAL and PACKAGING

- CASE: Void-free transfer molded thermosetting epoxy compound meeting UL94V-0
- TERMINALS: Annealed matte-tin plating over copper and readily solderable per MIL-STD-750, method 2026. (Consult factor for tin-lead plating.)
- MARKING: 301A• (dot indicates “e3” designation)
- POLARITY: Cathode designated by TAB 2
- TAPE & REEL option: 16 mm tape per standard EIA-481-B. Consult factory for quantities.
- WEIGHT: Approximately 0.072 gram
- See [Package Dimensions](#) on last page.

PART NOMENCLATURE

SYMBOLS & DEFINITIONS

Symbol	Definition
I_G	Gate Current: The direct current into the gate terminal.
I_R	Reverse Current: The anode current for a negative anode voltage.
I_T	On-State Current: The anode, principal or thyristor current when the thyristor is in the on state.
V_D	Off-State Voltage: The anode, principal, or thyristor voltage when the thyristor is in the off state.
V_{RRM}	Reverse Voltage, Repetitive Peak: The peak reverse voltage including all repetitive transient voltages but excluding all nonrepetitive transient voltages.
V_{DRM}	Repetitive Peak Off-State Voltage: The highest instantaneous value of the off-state voltage, including all repetitive transient voltages but excluding all nonrepetitive transient voltages.

ELECTRICAL CHARACTERISTICS @ $T_A = +25\text{ }^\circ\text{C}$ unless otherwise noted

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Units
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On characteristics (up to 100 A w/ 100 ns pulse @ Duty Cycle = 0.0001% or less)

Forward Blocking Current	I_{DRM}	$V_{DRM} = 100\text{ V}, R_{GK} = 1\text{ k}\Omega$			1.0	μA
On - State Voltage	V_T	$I_T = 1\text{ A}, I_g = 10\text{ mA}$		1.1	1.5	V
Gate Trigger Voltage	V_{GT}	$V_D = 5\text{ V}, R_{GS} = 100\ \Omega$		0.5	0.75	V
Gate Trigger Current	I_{GT}	$V_D = 5\text{ V}, R_{GS} = 10\text{ k}\Omega$		10	200	μA
Reverse Gate Current	I_{GR}	$V_{GR} = 5\text{ V}$		0.01	0.1	mA
Holding Current	I_H	$V_D = 5\text{ V}, R_{GK} = 1\text{ k}\Omega$	1.0	3.0	5.0	mA
Reverse Current (Note 1)	I_{RRM}	$V_{RRM} = 30\text{ V}, R_{GK} = 1\text{ k}\Omega$		1	10	mA

Switching characteristics ($T_c = 25\text{ }^\circ\text{C}$)

Delay Time	td	$I_g = 20\text{ mA}, I_T = 1\text{ A}$		20	30	ns
Rise Time	tr	$V_D = 60\text{ V}, I_T = 1\text{ A}, I_g = 10\text{ mA}$ dc < 1%		15	25	ns
Circuit Commutated Turn—off Time	tq	$I_T = 1.0\text{ A}, I_R = 1.0\text{ A max},$ $R_{GK} = 1\text{ k}\Omega$		0.3	0.5	μs
Gate Trigger—on Pulse Width	tpg(on)	$I_g = 10\text{ mA}, I_T = 1\text{ A}$		20	50	ns
Critical Rate of Rise Off -State Voltage	dv/dt	$V_D = 30\text{ V}, R_{GK} = 1\text{ k}\Omega$	15	30		V/ μs

Note 1: Pulse Test intended to guarantee reverse anode voltage capability for pulse commutation. The device should not be operated in the reverse blocking mode on a continuous basis.

GRAPHS

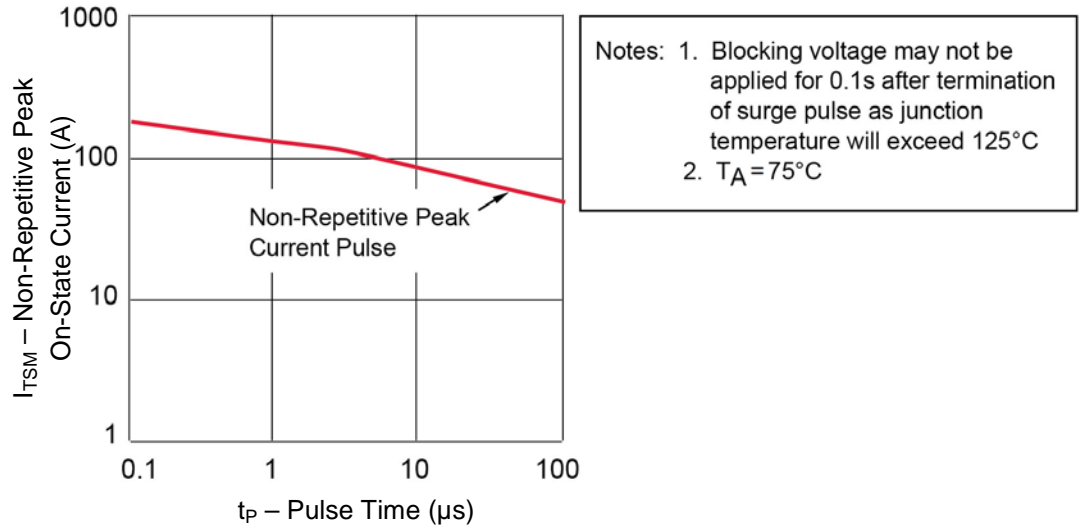


FIGURE 1
Surge Rating

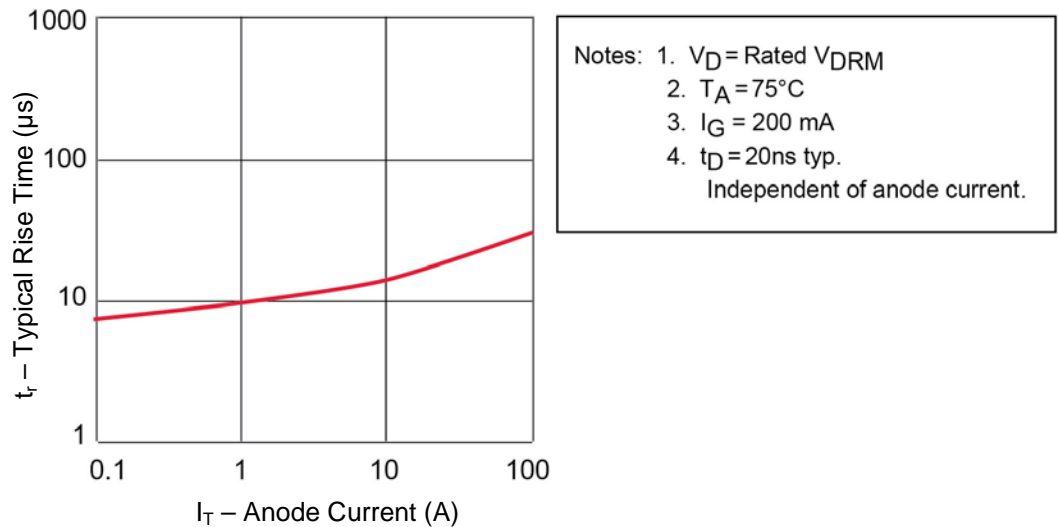
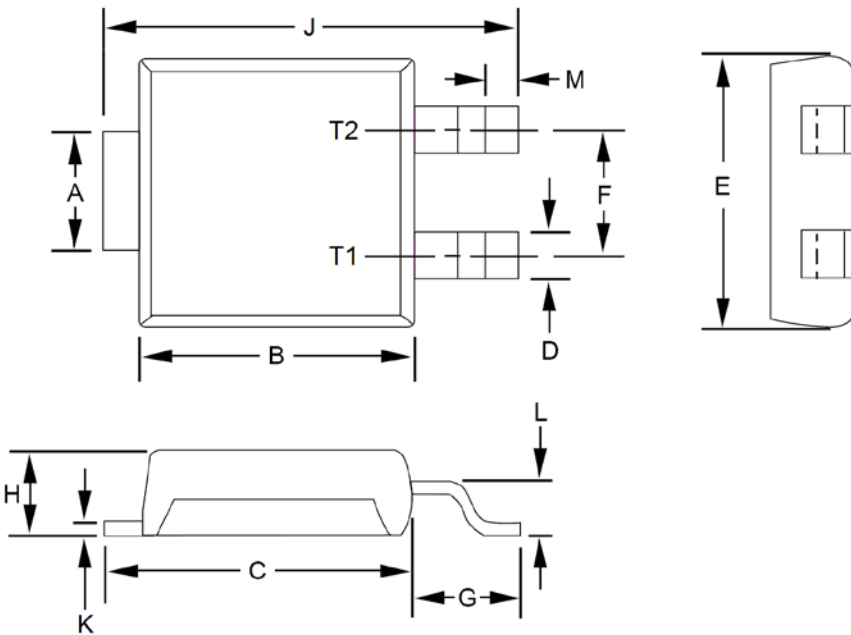


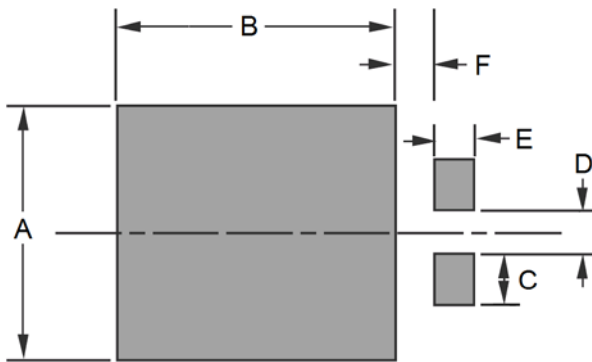
FIGURE 2
Switching Speed vs. Current

PACKAGE DIMENSIONS



DIM	INCH		MILLIMETERS	
	MIN	MAX	MIN	MAX
A	0.068	0.072	1.73	1.83
B	0.172	0.174	4.37	4.43
C	0.197	0.204	5.01	5.17
D	0.035 NOM		0.889 NOM	
E	0.159	0.161	4.03	4.09
F	0.072 NOM		1.83 NOM	
G	0.056 NOM		1.422 NOM	
H	0.043	0.045	1.10	1.14
J	0.252	0.260	6.40	6.61
K	0.007 NOM		0.178 NOM	
L	0.028	0.030	0.71	0.77
M	0.014	0.018	0.36	0.46
T1	Gate (Tab 1)			
T2	Cathode (Tab 2)			
Base	Anode			

PAD LAYOUT



DIM	INCH	MILLIMETERS
	NOMINAL	NOMINAL
A	0.190	4.826
B	0.210	5.344
C	0.038	0.965
D	0.034	0.864
E	0.030	0.762
F	0.030	0.762

SCHEMATIC

