



**1N40A**

Preliminary

Power MOSFET

**1A, 400V N-CHANNEL  
POWER MOSFET**

■ DESCRIPTION

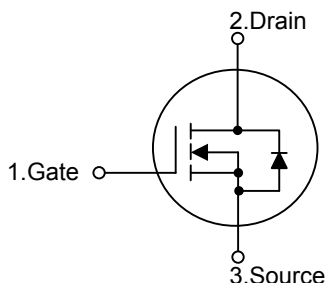
The UTC **1N40A** is an N-channel mode power MOSFET using UTC's advanced technology to provide customers with planar stripe and DMOS technology. This technology is specialized in allowing a minimum on-state resistance and superior switching performance. It also can withstand high energy pulse in the avalanche and commutation mode.

The UTC **1N40A** is universally applied in electronic lamp ballast based on half bridge topology and high efficient switched mode power supply.

■ FEATURES

- \* High switching speed
- \*  $R_{DS(ON)} < 6.8\Omega @ V_{GS} = 10V, I_D = 0.5A$
- \* 100% avalanche tested

■ SYMBOL

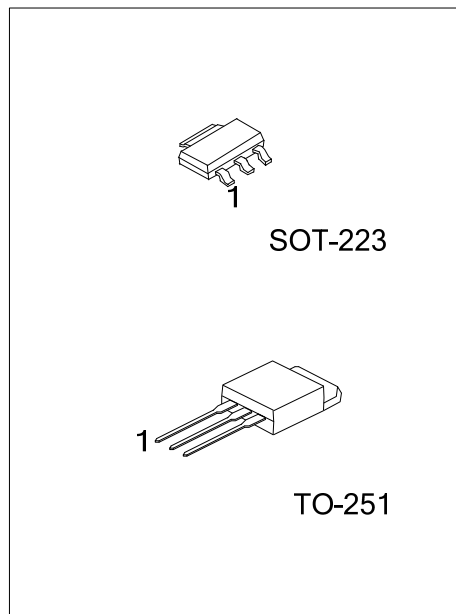


■ ORDERING INFORMATION

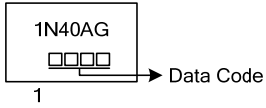
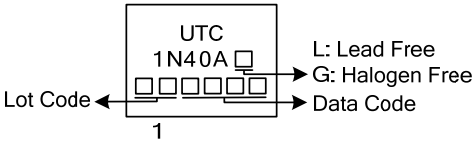
Ordering Number		Package	Pin Assignment			Packing
Lead Free	Halogen Free		1	2	3	
-	1N40AG-AA3-R	SOT-223	G	D	S	Tape Reel
1N40AL-TM3-T	1N40AG-TM3-T	TO-251	G	D	S	Tube

Note: Pin Assignment: G: Gate D: Drain S: Source

<p>1N40AG-TA3-R</p>	<p>(1) Packing Type</p> <p>(2) Package Type</p> <p>(3) Green Package</p>	<p>(1) T: Tubel, R: Tape Reel</p> <p>(2) AA3: SOT-223, TM3: TO-251</p> <p>(3) L: Lead Free, G: Halogen Free and Lead Free</p>
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### MARKING

SOT-223	TO-251
 <p>1N40AG □□□□ → Data Code 1</p>	 <p>UTC 1N40A □ □□□□□ □ → Data Code Lot Code ← 1</p> <p>L: Lead Free G: Halogen Free</p>

■ ABSOLUTE MAXIMUM RATINGS ( $T_c=25^\circ\text{C}$ , unless otherwise specified)

PARAMETER		SYMBOL	RATINGS	UNIT
Drain-Source Voltage		$V_{DSS}$	400	V
Gate-Source Voltage		$V_{GSS}$	$\pm 30$	V
Drain Current	Continuous ( $T_c=25^\circ\text{C}$ )	$I_D$	1	A
	Pulsed (Note 2)	$I_{DM}$	4	A
Avalanche Energy	Single Pulsed (Note 3)	$E_{AS}$	40	mJ
Peak Diode Recovery dv/dt (Note 4)		dv/dt	4.5	V/ns
Power Dissipation	SOT-223	$P_D$	1	W
	TO-251		25	W
Derate above $25^\circ\text{C}$	SOT-223	$P_D$	125	$\text{W}/^\circ\text{C}$
	TO-251		0.2	$\text{W}/^\circ\text{C}$
Junction Temperature		$T_J$	+150	$^\circ\text{C}$
Storage Temperature		$T_{STG}$	-55~+150	$^\circ\text{C}$

Notes: 1. Absolute maximum ratings are those values beyond which the device could be permanently damaged.

Absolute maximum ratings are stress ratings only and functional device operation is not implied.

2. Repetitive Rating: Pulse width limited by maximum junction temperature

3.  $L = 80\text{mH}$ ,  $I_{AS} = 1\text{A}$ ,  $V_{DD} = 50\text{V}$ ,  $R_G = 25\Omega$ , Starting  $T_J = 25^\circ\text{C}$

4.  $I_{SD} \leq 1.8\text{A}$ ,  $di/dt \leq 200\text{A}/\mu\text{s}$ ,  $V_{DD} \leq BV_{DSS}$ , Starting  $T_J = 25^\circ\text{C}$

■ THERMAL DATA

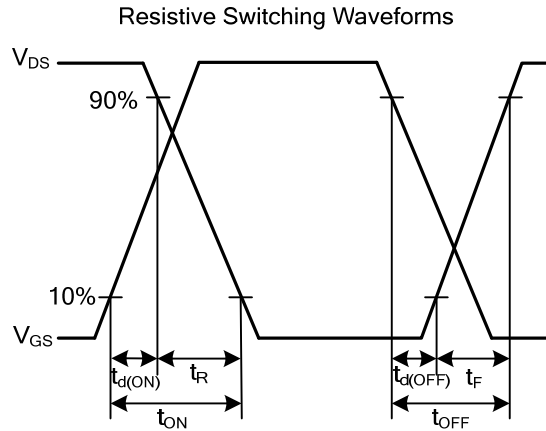
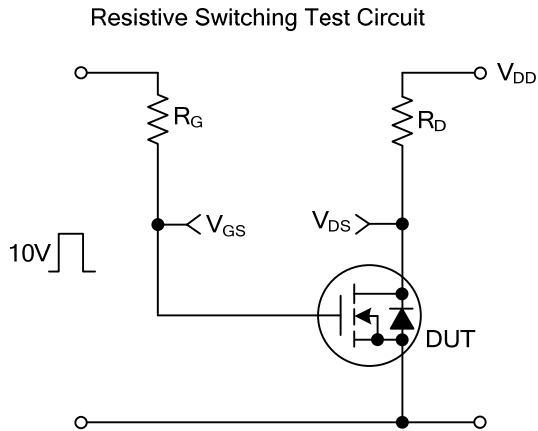
PARAMETER		SYMBOL	RATINGS	UNIT
Junction to Ambient	SOT-223	$\theta_{JA}$	150	$^\circ\text{C}/\text{W}$
	TO-251		110	$^\circ\text{C}/\text{W}$
Junction to Case	SOT-223	$\theta_{JC}$	125	$^\circ\text{C}/\text{W}$
	TO-251		5	$^\circ\text{C}/\text{W}$

■ ELECTRICAL CHARACTERISTICS ( $T_c=25^\circ\text{C}$ , unless otherwise noted)

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
<b>OFF CHARACTERISTICS</b>						
Drain-Source Breakdown Voltage	$BV_{DSS}$	$I_D=250\mu\text{A}$ , $V_{GS}=0\text{V}$	400			V
Breakdown Voltage Temperature Coefficient	$\Delta BV_{DSS}/\Delta T_J$	Reference to $25^\circ\text{C}$ , $I_D=250\mu\text{A}$		0.4		$\text{V}/^\circ\text{C}$
Drain-Source Leakage Current	$I_{DSS}$	$V_{DS}=400\text{V}$ , $V_{GS}=0\text{V}$			1	$\mu\text{A}$
Gate- Source Leakage Current	Forward	$V_{GS}=+30\text{V}$ , $V_{DS}=0\text{V}$ $V_{GS}=-30\text{V}$ , $V_{DS}=0\text{V}$			+100	nA
	Reverse				-100	nA
<b>ON CHARACTERISTICS</b>						
Gate Threshold Voltage	$V_{GS(TH)}$	$V_{DS}=V_{GS}$ , $I_D=250\mu\text{A}$	2.0		4.0	V
Static Drain-Source On-State Resistance	$R_{DS(ON)}$	$V_{GS}=10\text{V}$ , $I_D=0.5\text{A}$		4.0	6.8	$\Omega$
<b>DYNAMIC PARAMETERS</b>						
Input Capacitance	$C_{ISS}$	$V_{GS}=0\text{V}$ , $V_{DS}=25\text{V}$ , $f=1.0\text{MHz}$		125	150	pF
Output Capacitance	$C_{OSS}$			20	30	pF
Reverse Transfer Capacitance	$C_{RSS}$			17	28	pF
<b>SWITCHING PARAMETERS</b>						
Total Gate Charge	$Q_G$	$V_{GS}=10\text{V}$ , $V_{DS}=50\text{V}$ , $I_D=1.3\text{A}$ (Note 1, 2)		10	15	nC
Gate to Source Charge	$Q_{GS}$			3.22		nC
Gate to Drain Charge	$Q_{GD}$			0.8		nC
Turn-ON Delay Time	$t_{D(ON)}$	$V_{DD}=30\text{V}$ , $I_D=0.5\text{A}$ , $R_G=25\Omega$ (Note 1, 2)		33	40	ns
Rise Time	$t_R$			20	35	ns
Turn-OFF Delay Time	$t_{D(OFF)}$			58	78	ns
Fall-Time	$t_F$			17	30	ns
<b>SOURCE- DRAIN DIODE RATINGS AND CHARACTERISTICS</b>						
Maximum Body-Diode Continuous Current	$I_S$				1.0	A
Maximum Body-Diode Pulsed Current	$I_{SM}$				4.0	A
Drain-Source Diode Forward Voltage	$V_{SD}$	$I_S=1\text{A}$ , $V_{GS}=0\text{V}$			1.5	V

- Notes: 1. Pulse Test: Pulse width  $\leq 300\mu\text{s}$ , Duty cycle  $\leq 2\%$   
2. Essentially independent of operating temperature

■ TEST CIRCUITS AND WAVEFORMS



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