

**2N40**

Preliminary

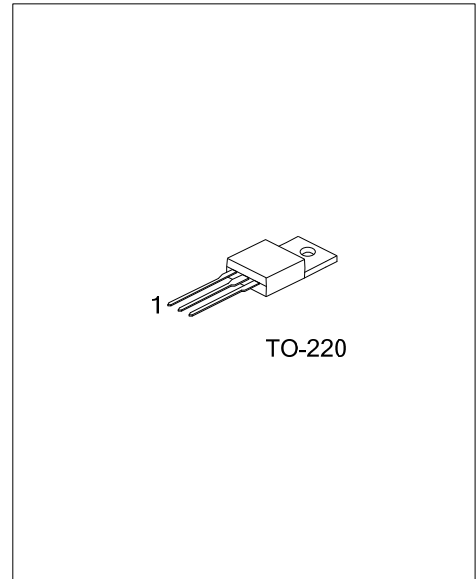
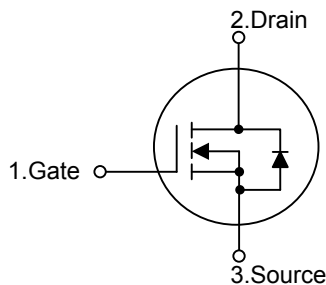
Power MOSFET**2 Amps, 400 Volts
N-CHANNEL POWER MOSFET****DESCRIPTION**

The UTC **2N40** is an N-channel mode power MOSFET using UTC's advanced technology to provide customers with a minimum on-state resistance, stable off-state characteristics and superior switching performance. It also can withstand high energy pulse in the avalanche.

The UTC **2N40** is usually used in general purpose switching applications, motor control circuits and switched mode power supply.

FEATURES

- * High switching speed
- * 2A, 400V, $R_{DS(ON)}=3.5\Omega$ @ $V_{GS}=10V$
- * 100% avalanche tested

SYMBOL**ORDERING INFORMATION**

Ordering Number		Package	Pin Assignment			Packing
Lead Free	Halogen Free		1	2	3	
2N40L-TA3-T	2N40G-TA3-T	TO-220	G	D	S	Tube

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

2N40L-TA3-T		(1)Packing Type	(1) T: Tube
		(2)Package Type	(2) TA3: TO-220
		(3)Lead Free	(3) G: Halogen Free, L: Lead Free

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

PARAMETER		SYMBOL	RATINGS	UNIT
Drain-Source Voltage		V_{DSS}	400	V
Gate-Source Voltage		V_{GSS}	± 30	V
Drain Current	Continuous	I_{D}	2	A
	Pulsed	I_{DM}	7	A
Avalanche Current		I_{AR}	2.5	A
Single Pulsed Avalanche Energy		E_{AS}	100	mJ
Power Dissipation		P_{D}	25	W
Linear Derating Factor		$\Delta P_{\text{D}}/\Delta T_{\text{mb}}$	0.2	W/ $^{\circ}\text{C}$
Junction Temperature		T_{J}	150	$^{\circ}\text{C}$
Storage Temperature Range		T_{STG}	-55~150	$^{\circ}\text{C}$

Note: 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.

■ THERMAL CHARACTERISTICS

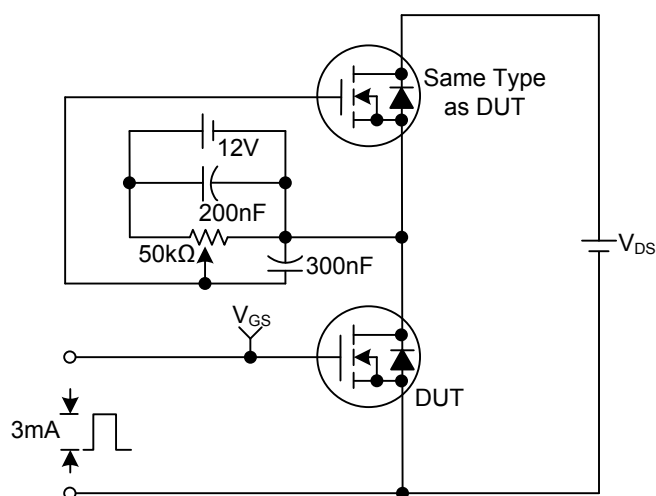
PARAMETER	SYMBOL	RATINGS	UNIT
Junction to Ambient	θ_{JA}	62.5	$^{\circ}\text{C/W}$
Junction to Case	θ_{JC}	5	$^{\circ}\text{C/W}$

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

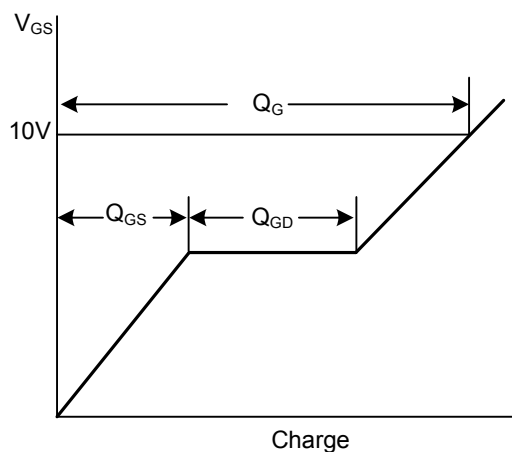
PARAMETER		SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
OFF CHARACTERISTICS							
Drain-Source Breakdown Voltage		BV _{DSS}	I _D =250μA, V _{GS} =0V	400			V
Breakdown Voltage Temperature Coefficient		ΔBV _{DSS} /ΔT _J	V _{DS} =V _{GS} , I _D =250μA		0.45		V/°C
Drain-Source Leakage Current		I _{DSS}	V _{DS} =400V, V _{GS} =0V		1	25	μA
Gate- Source Leakage Current	Forward	I _{GSS}	V _{GS} =+30V, V _{DS} =0V		+10	+200	nA
	Reverse		V _{GS} =-30V, V _{DS} =0V		-10	-200	nA
ON CHARACTERISTICS							
Gate Threshold Voltage		V _{GS(TH)}	V _{DS} =V _{GS} , I _D =250μA	2.0	3.0	4.0	V
Static Drain-Source On-State Resistance		R _{DS(ON)}	V _{GS} =10V, I _D =1.25A		2.0	3.5	Ω
DYNAMIC PARAMETERS							
Input Capacitance		C _{ISS}	V _{GS} =0V, V _{DS} =25V, f=1.0MHz		240		pF
Output Capacitance		C _{OSS}			44		pF
Reverse Transfer Capacitance		C _{RSS}			26		pF
SWITCHING PARAMETERS							
Total Gate Charge		Q _{G(TOT)}	V _{GS} =10V, V _{DS} =320V, I _D =2.5A		20	25	nC
Gate to Source Charge		Q _{GS}			2	3	nC
Gate to Drain Charge		Q _{GD}			8	12	nC
Turn-ON Delay Time		t _{D(ON)}	V _{DD} =200V, I _D =2.5A, R _G =24Ω, R _D =78 Ω		10		ns
Rise Time		t _R			25		ns
Turn-OFF Delay Time		t _{D(OFF)}			46		ns
Fall-Time		t _F			25		ns
Internal Drain Inductance		L _D	Measured from drain lead 6 mm from package to centre of die		4.5		nH
Internal Source Inductance		L _S	Measured from source lead 6 mm from package to source bond pad		7.5		nH
SOURCE- DRAIN DIODE RATINGS AND CHARACTERISTICS							
Maximum Body-Diode Continuous Current		I _S	T _C =25°C			2.5	A
Maximum Body-Diode Pulsed Current		I _{SM}				10	A
Drain-Source Diode Forward Voltage		V _{SD}	I _S =2.5A, V _{GS} =0V			1.2	V
Body Diode Reverse Recovery Time		t _{RR}	I _S =2.5A, V _{GS} =0V, dI/dt=100A/μs		200		ns
Body Diode Reverse Recovery Charge		Q _{RR}			2.0		μC

■ TEST CIRCUITS AND WAVEFORMS

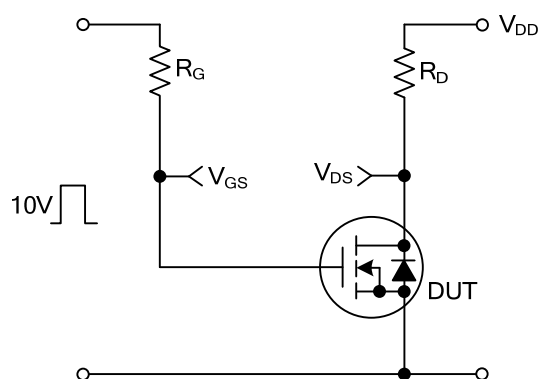
Gate Charge Test Circuit



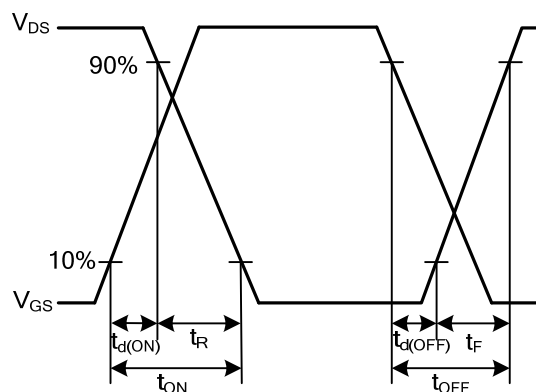
Gate Charge Waveforms



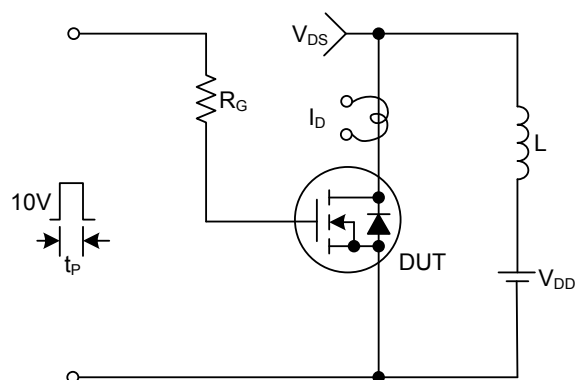
Resistive Switching Test Circuit



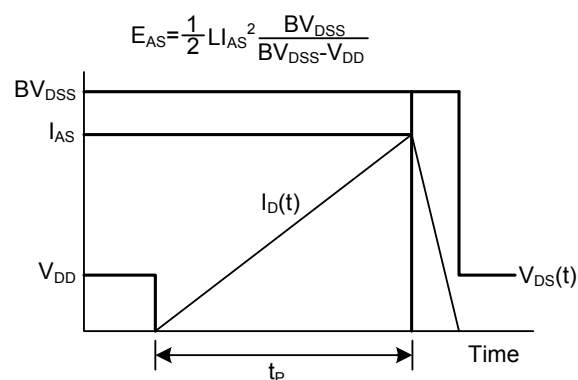
Resistive Switching Waveforms



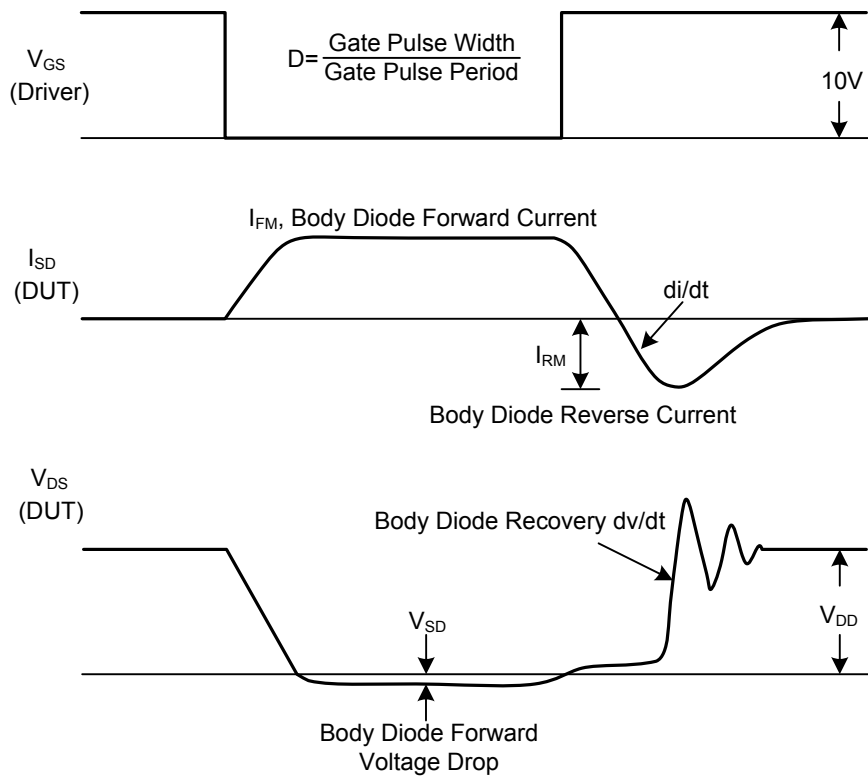
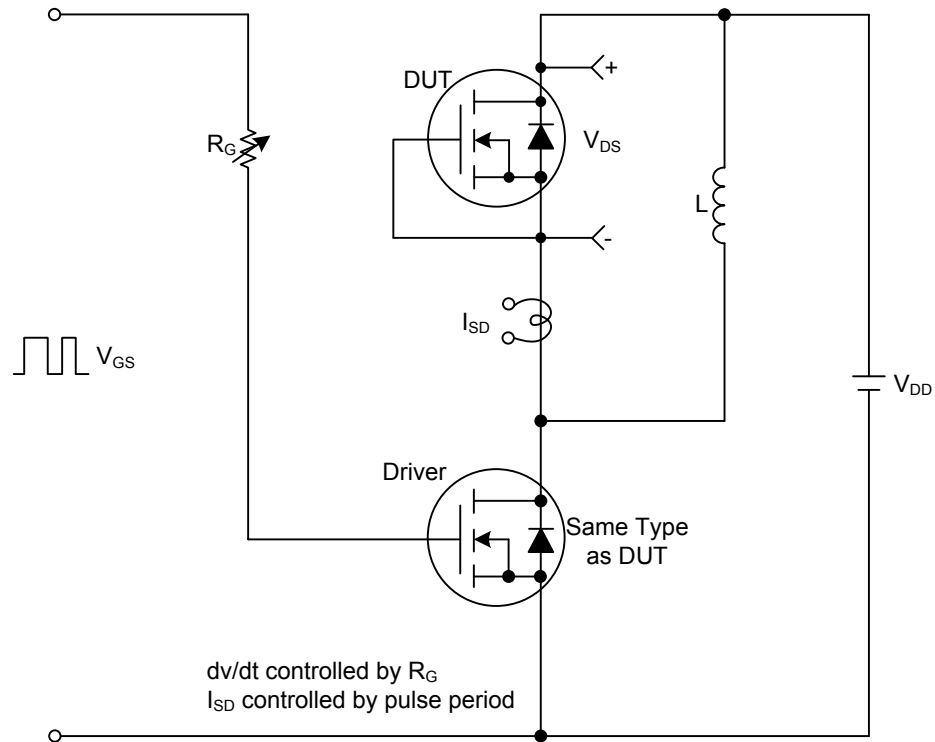
Unclamped Inductive Switching Test Circuit



Unclamped Inductive Switching Waveforms



■ TEST CIRCUITS AND WAVEFORMS(Cont.)

Peak Diode Recovery dv/dt Test Circuit & Waveforms

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