



15N40K-MT

Power MOSFET

15A, 400V N-CHANNEL POWER MOSFET

DESCRIPTION

The UTC **15N40K-MT** is an N-channel mode power MOSFET using UTC's advanced technology to provide customers with planar stripe and DMOS technology. This technology allows a minimum on-state resistance and superior switching performance. It also can withstand high energy pulse in the avalanche and commutation mode.

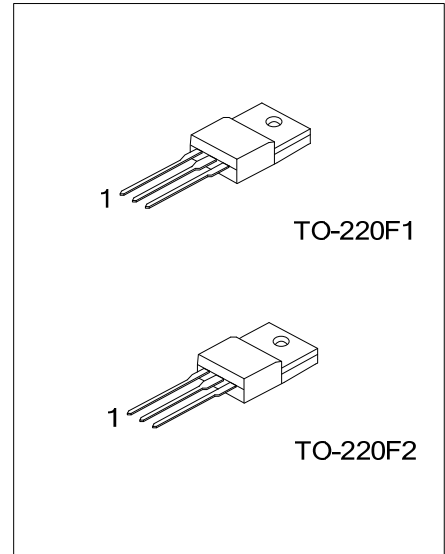
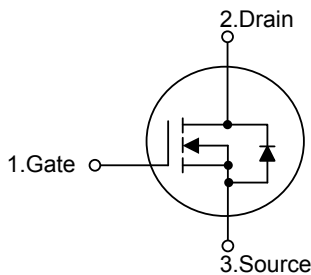
The UTC **15N40K-MT** is generally applied in high efficiency switch mode power supplies.

FEATURES

* $R_{DS(ON)} < 0.30\Omega$ @ $V_{GS} = 10V, I_D = 7.5A$

* High Switching Speed

SYMBOL



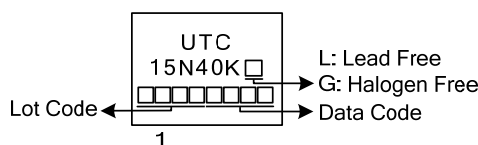
ORDERING INFORMATION

Ordering Number		Package	Pin Assignment			Packing
Lead Free	Halogen Free		1	2	3	
15N40KL-TF1-T	15N40KG-TF1-T	TO-220F1	G	D	S	Tube
15N40KL-TF2-T	15N40KG-TF2-T	TO-220F2	G	D	S	Tube

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

<p>15N40KL-TF2-T</p> <p>(1) Packing Type</p> <p>(2) Package Type</p> <p>(3) Green Package</p>	<p>(1) T: Tube</p> <p>(2) TF1: TO-220F1, TF2: TO-220F2</p> <p>(3) L: Lead Free, G: Halogen Free and Lead Free</p>
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MARKING



■ ABSOLUTE MAXIMUM RATINGS ($T_C=25^\circ\text{C}$, unless otherwise specified.) (Note 5)

PARAMETER		SYMBOL	RATINGS	UNIT
Drain to Source Voltage		V_{DSS}	400	V
Gate-Source Voltage		V_{GSS}	± 30	V
Drain Current	Continuous $T_C=25^\circ\text{C}$	I_D	15	A
	Pulsed (Note 2)	I_{DM}	60	A
Avalanche Current (Note 2)		I_{AR}	15	A
Avalanche Energy	Single Pulsed (Note 3)	E_{AS}	586	mJ
Peak Diode Recovery dv/dt (Note 4)		dv/dt	15	V/ns
Power Dissipation ($T_C=25^\circ\text{C}$)	TO-220F1	P_D	170	W
	TO-220F2		52	W
Derate above 25°C	TO-220F1		1.45	W/ $^\circ\text{C}$
	TO-220F2		0.416	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. $L=5.21\text{mH}$, $I_{AS}=15\text{A}$, $V_{DD}=50\text{V}$, $R_G=25\Omega$, Starting $T_J=25^\circ\text{C}$

4. $I_{SD}\leq 15\text{A}$, $di/dt\leq 200\text{A}/\mu\text{s}$, $V_{DD}\leq BV_{DSS}$, Starting $T_J=25^\circ\text{C}$

5. Drain current limited by maximum junction temperature.

■ THERMAL DATA

PARAMETER		SYMBOL	RATINGS	UNIT
Junction to Ambient		θ_{JA}	62.5	$^\circ\text{C}/\text{W}$
Junction to Case	TO-220F1	θ_{JC}	0.7	$^\circ\text{C}/\text{W}$
	TO-220F2		2.4	$^\circ\text{C}/\text{W}$

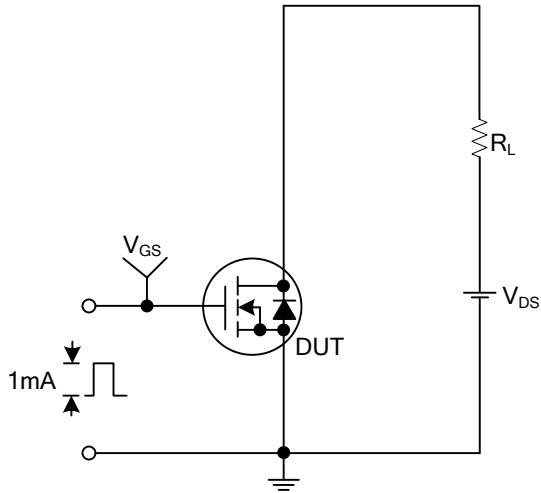
■ ELECTRICAL CHARACTERISTICS

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
OFF CHARACTERISTICS						
Drain-Source Breakdown Voltage	BV_{DSS}	$I_D=250\mu A, V_{GS}=0V, T_J=25^\circ C$	400			V
Breakdown Voltage Temperature Coefficient	$\Delta BV_{DSS}/\Delta T_J$	Reference to $25^\circ C, I_D=250\mu A$		0.5		$V/^\circ C$
Drain-Source Leakage Current	I_{DSS}	$V_{DS}=400V, V_{GS}=0V,$			1	μA
		$V_{DS}=320V, T_C=125^\circ C$			10	μA
Gate- Source Leakage Current	Forward	$V_{GS}=+30V, V_{DS}=0V$			+100	nA
	Reverse	$V_{GS}=-30V, V_{DS}=0V$			-100	nA
ON CHARACTERISTICS						
Gate Threshold Voltage	$V_{GS(TH)}$	$V_{GS}=V_{DS}, I_D=250\mu A$	2.0		4.0	V
Static Drain-Source On-State Resistance	$R_{DS(ON)}$	$V_{GS}=10V, I_D=7.5A$		0.23	0.30	Ω
DYNAMIC PARAMETERS						
Input Capacitance	C_{ISS}	$V_{DS}=25V, V_{GS}=0V, f=1.0MHz$		865		pF
Output Capacitance	C_{OSS}			200		pF
Reverse Transfer Capacitance	C_{RSS}			10.9		pF
SWITCHING PARAMETERS						
Turn-ON Delay Time	$t_{D(ON)}$	$V_{DS}=30V, I_D=0.5A, R_G=25\Omega$ (Note 1, 2)		72		ns
Rise Time	t_R			108		ns
Turn-OFF Delay Time	$t_{D(OFF)}$			226		ns
Fall-Time	t_F			124		ns
Total Gate Charge	Q_G	$V_{GS}=10V, V_{DS}=50V, I_D=1.3A$ (Note 1, 2)		38.6		nC
Gate to Source Charge	Q_{GS}			10.2		nC
Gate to Drain ("Miller") Charge	Q_{GD}			9.6		nC
SOURCE- DRAIN DIODE RATINGS AND CHARACTERISTICS						
Maximum Body-Diode Continuous Current	I_S				15	A
Maximum Body-Diode Pulsed Current	I_{SM}				60	A
Drain-Source Diode Forward Voltage	V_{SD}	$I_{SD}=15A, V_{GS}=0V$			1.4	V

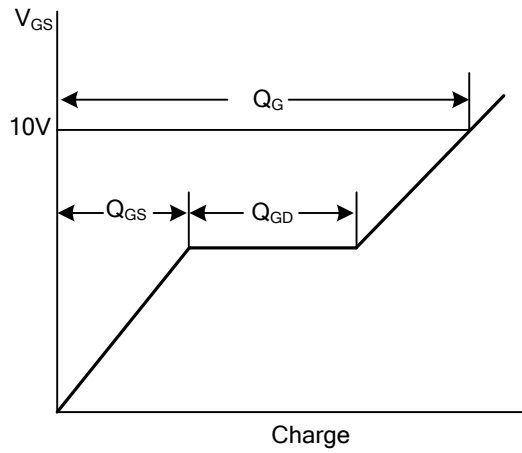
Notes: 1. Pulse Test: Pulse width $\leq 300\mu s$; Duty Cycle $\leq 2\%$.

2. Essentially Independent of Operating Temperature Typical Characteristics.

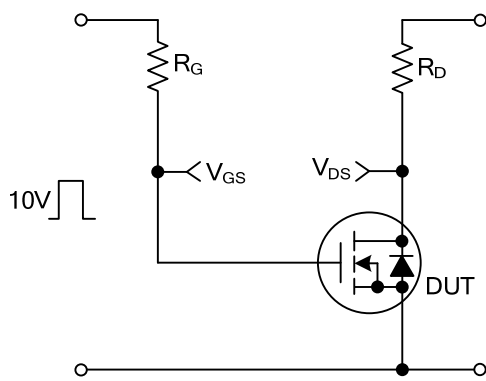
TEST CIRCUITS AND WAVEFORMS



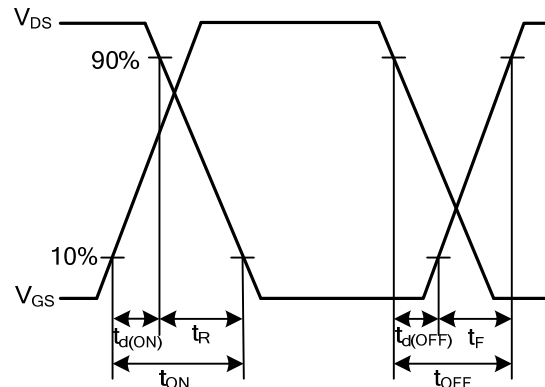
Gate Charge Test Circuit



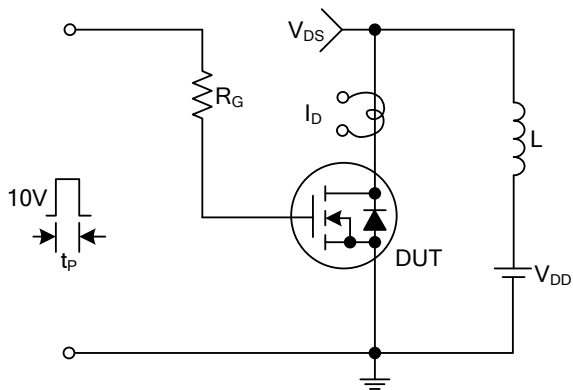
Gate Charge Waveforms



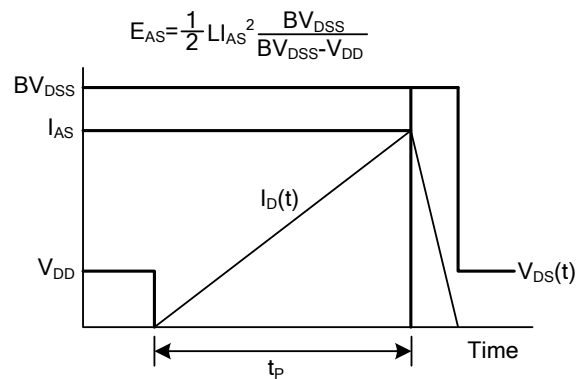
Resistive Switching Test Circuit



Resistive Switching Waveforms



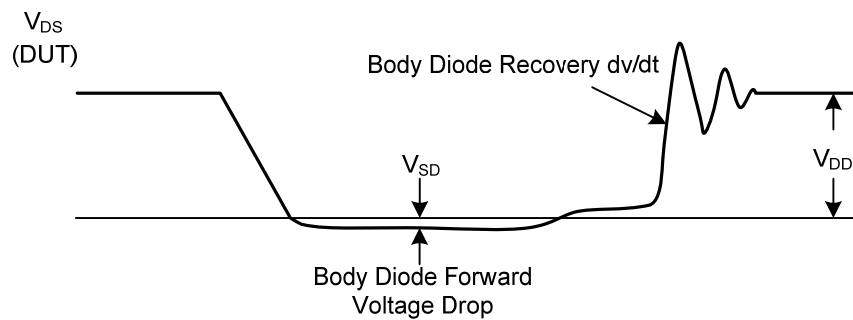
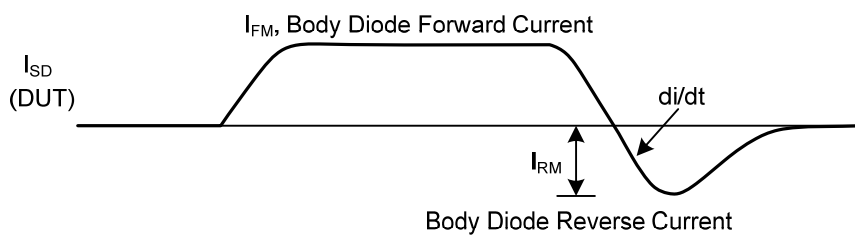
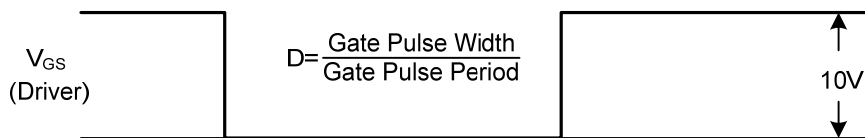
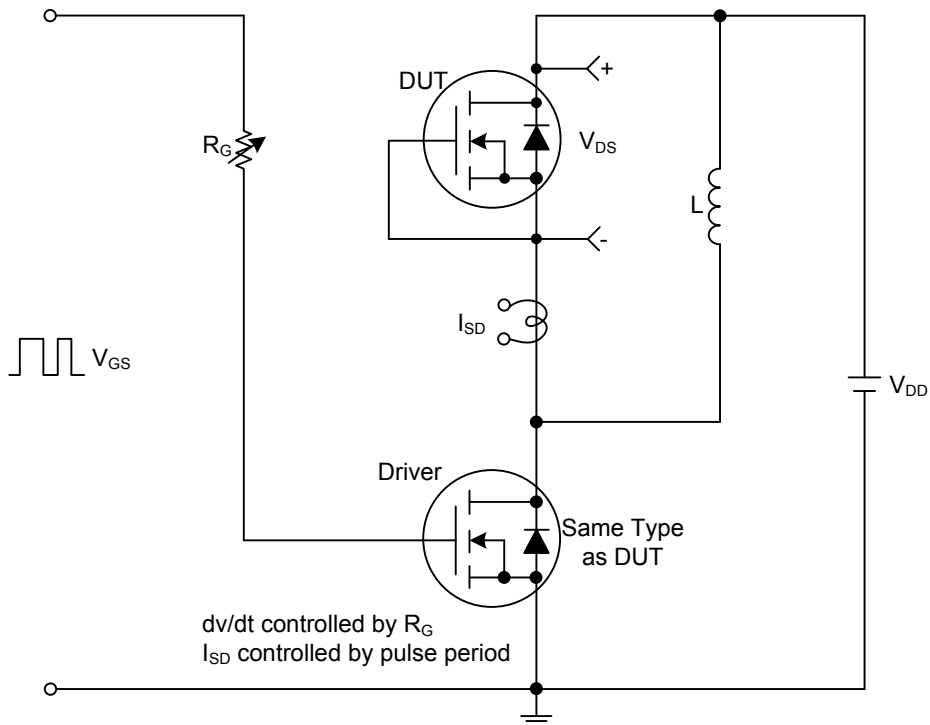
Unclamped Inductive Switching Test Circuit



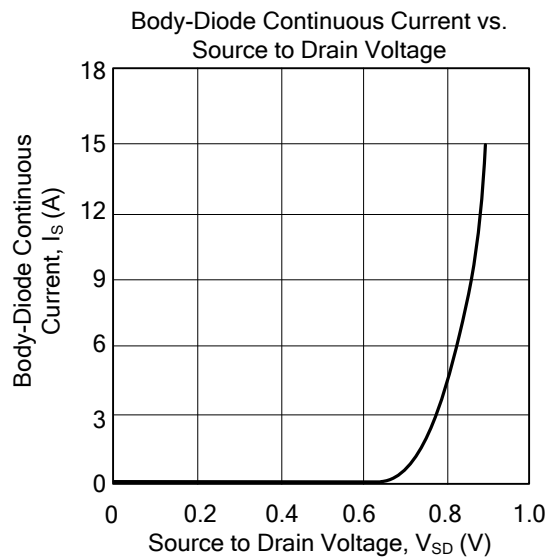
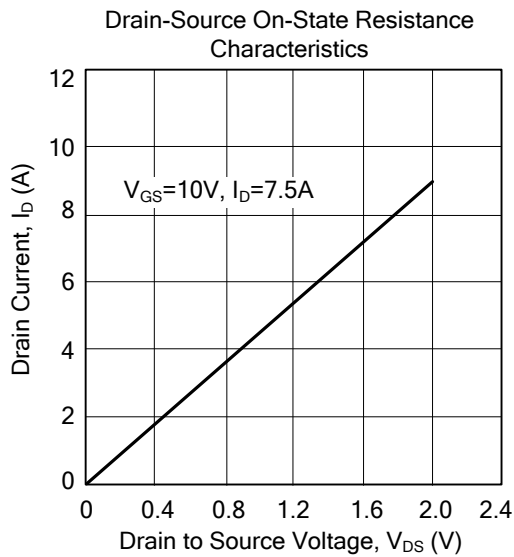
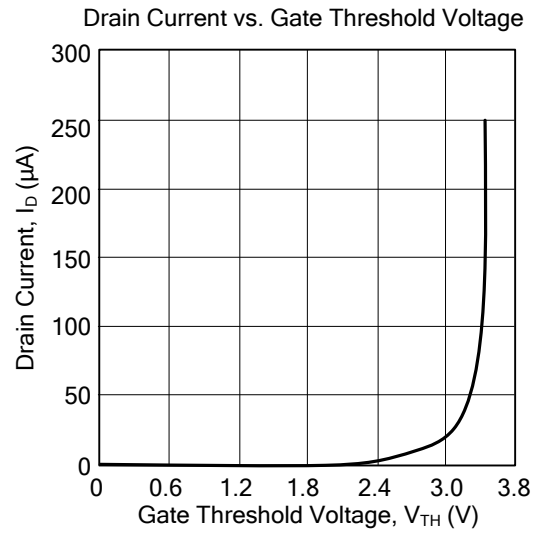
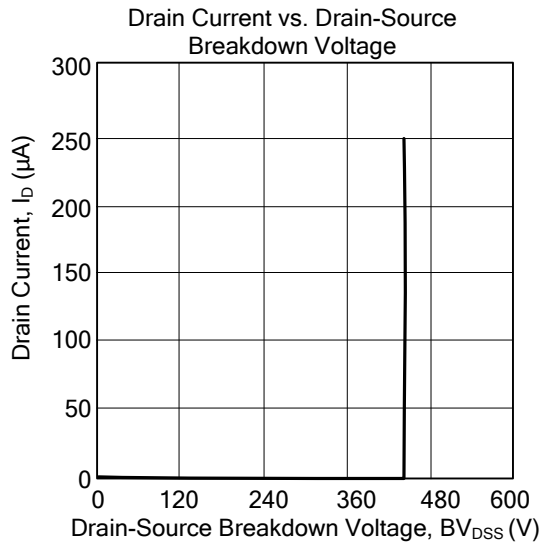
Unclamped Inductive Switching Waveforms

TEST CIRCUITS AND WAVEFORMS(Cont.)

Peak Diode Recovery dv/dt Test Circuit & Waveforms



TYPICAL CHARACTERISTICS



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