



7N70

Power MOSFET

7A, 700V N-CHANNEL POWER MOSFET

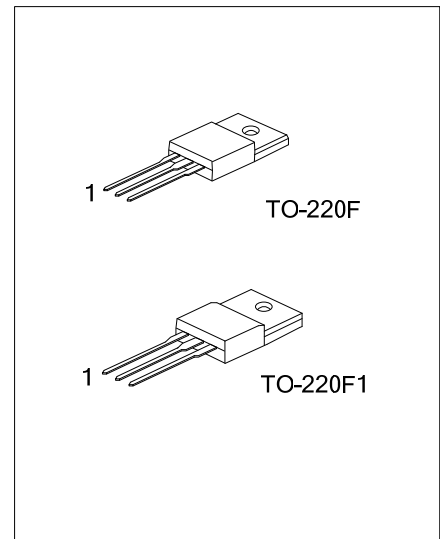
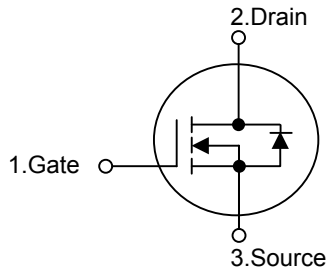
DESCRIPTION

The **UTC 7N70** is a high voltage power MOSFET and is designed to have better characteristics, such as fast switching time, low gate charge, low on-state resistance and have a high rugged avalanche characteristics. This power MOSFET is usually used at high speed switching applications in power supplies, PWM motor controls, high efficient DC to DC converters and bridge circuits.

FEATURES

- * $R_{DS(ON)} = 1.6\Omega @ V_{GS} = 10V$
- * Ultra low gate charge (typical 30 nC)
- * Low reverse transfer capacitance ($C_{RSS} =$ typical 18 pF)
- * Fast switching capability
- * Avalanche energy specified
- * Improved dv/dt capability, high ruggedness

SYMBOL



ORDERING INFORMATION

Order Number		Package	Pin Assignment			Packing
Lead Free	Halogen Free		1	2	3	
7N70L-TF3-T	7N70G-TF3-T	TO-220F	G	D	S	Tube
7N70L-TF1-T	7N70G-TF1-T	TO-220F1	G	D	S	Tube

<p>7N70L-TF3-T</p>	<p>(1) T: Tube</p> <p>(2) TF3: TO-220F, TF1: TO-220F1</p> <p>(3) G: Halogen Free, L: Lead Free</p>
--------------------	--

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

PARAMETER	SYMBOL	RATINGS	UNIT
Drain-Source Voltage	V_{DSS}	700	V
Gate-Source Voltage	V_{GSS}	± 30	V
Continuous Drain Current	I_D	$T_C = 25^\circ\text{C}$	A
		$T_C = 100^\circ\text{C}$	A
Drain Current Pulsed (Note 2)	I_{DM}	28	A
Avalanche Energy, Single Pulsed (Note 3)	E_{AS}	530	mJ
Avalanche Energy, Repetitive, Limited by T_{JMAX}	E_{AR}	14.2	mJ
Peak Diode Recovery dv/dt (Note 4)	dv/dt	4.5	V/ns
Power Dissipation ($T_C = 25^\circ\text{C}$)	P_D	TO-220F	W
		TO-220F1	W
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 T_J

3. $L = 19.5\text{mH}$, $I_{AS} = 7.0\text{A}$, $V_{DD} = 50\text{V}$, $R_G = 0\ \Omega$, Starting $T_J = 25^\circ\text{C}$

4. $I_{SD} \leq 7.0\text{A}$, $di/dt \leq 100\text{A}/\mu\text{s}$, $V_{DD} \leq BV_{DSS}$, Starting $T_J = 25^\circ\text{C}$

■ THERMAL DATA

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

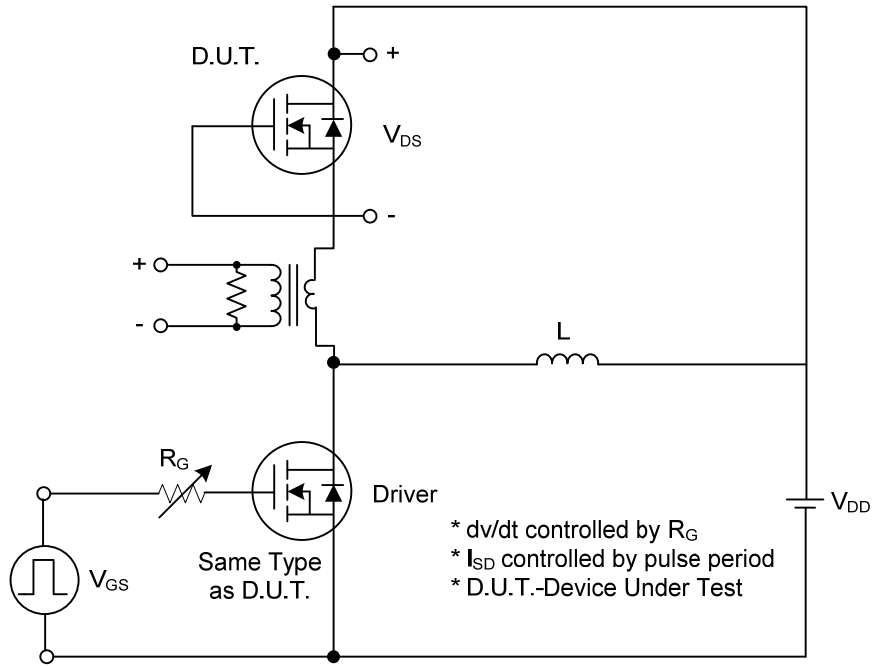
■ ELECTRICAL CHARACTERISTICS ($T_C=25^\circ\text{C}$, unless otherwise specified)

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
OFF CHARACTERISTICS						
Drain-Source Breakdown Voltage	BV_{DSS}	$V_{GS} = 0\text{ V}, I_D = 250\ \mu\text{A}$	700			V
Drain-Source Leakage Current	I_{DSS}	$V_{DS} = 700\text{ V}, V_{GS} = 0\text{ V}$			1	μA
		$V_{DS} = 560\text{ V}, T_C = 125^\circ\text{C}$			1	μA
Gate-Source Leakage Current	Forward	I_{GSS}			100	nA
	Reverse				-100	nA
Breakdown Voltage Temperature Coefficient	$\Delta BV_{DSS}/\Delta T_J$	$I_D=250\mu\text{A}$, Referenced to 25°C		0.67		$^\circ\text{V}/^\circ\text{C}$
ON CHARACTERISTICS						
Gate Threshold Voltage	$V_{GS(TH)}$	$V_{DS} = V_{GS}, I_D = 250\ \mu\text{A}$	2.0		4.0	V
Drain-Source ON-State Resistance	$R_{DS(ON)}$	$V_{GS} = 10\text{ V}, I_D = 3.5\text{ A}$		1.4	1.6	Ω
Forward Transconductance	g_{FS}	$V_{DS} = 40\text{ V}, I_D = 3.5\text{ A}$ (Note 1)		8.0		S
DYNAMIC CHARACTERISTICS						
Input Capacitance	C_{ISS}	$V_{DS} = 25\text{ V}, V_{GS} = 0\text{ V},$ $f = 1\text{ MHz}$		1200	1600	pF
Output Capacitance	C_{OSS}			150	190	pF
Reverse Transfer Capacitance	C_{RSS}			18	25	pF
SWITCHING CHARACTERISTICS						
Turn-on Delay Time	$t_{D(ON)}$	$V_{DD} = 350\text{ V}, I_D = 7.0\text{ A}$ (Note 1, 2)		35	80	ns
Turn-on Rise Time	t_R			79	165	ns
Turn-off Delay Time	$t_{D(OFF)}$			80	160	ns
Turn-off Fall Time	t_F			52	120	ns
Total Gate Charge	Q_G	$V_{DS} = 560\text{ V}, I_D = 7.0\text{ A},$ $V_{GS} = 10\text{ V}$ (Note 1, 2)		30		nC
Gate-Source Charge	Q_{GS}			6.5		nC
Gate-Drain Charge	Q_{DD}			13		nC
SOURCE- DRAIN DIODE RATINGS AND CHARACTERISTICS						
Drain-Source Diode Forward Voltage	V_{SD}	$V_{GS} = 0\text{ V}, I_S = 7.0\text{ A}$			1.4	V
Maximum Continuous Drain-Source Diode Forward Current	I_S				7.0	A
Maximum Pulsed Drain-Source Diode Forward Current	I_{SM}				28	A
Reverse Recovery Time	t_{rr}	$V_{GS} = 0\text{ V}, I_S = 7.0\text{ A},$ $di_F/dt = 100\text{ A}/\mu\text{s}$ (Note 1)		320		ns
Reverse Recovery Charge	Q_{RR}				2.4	

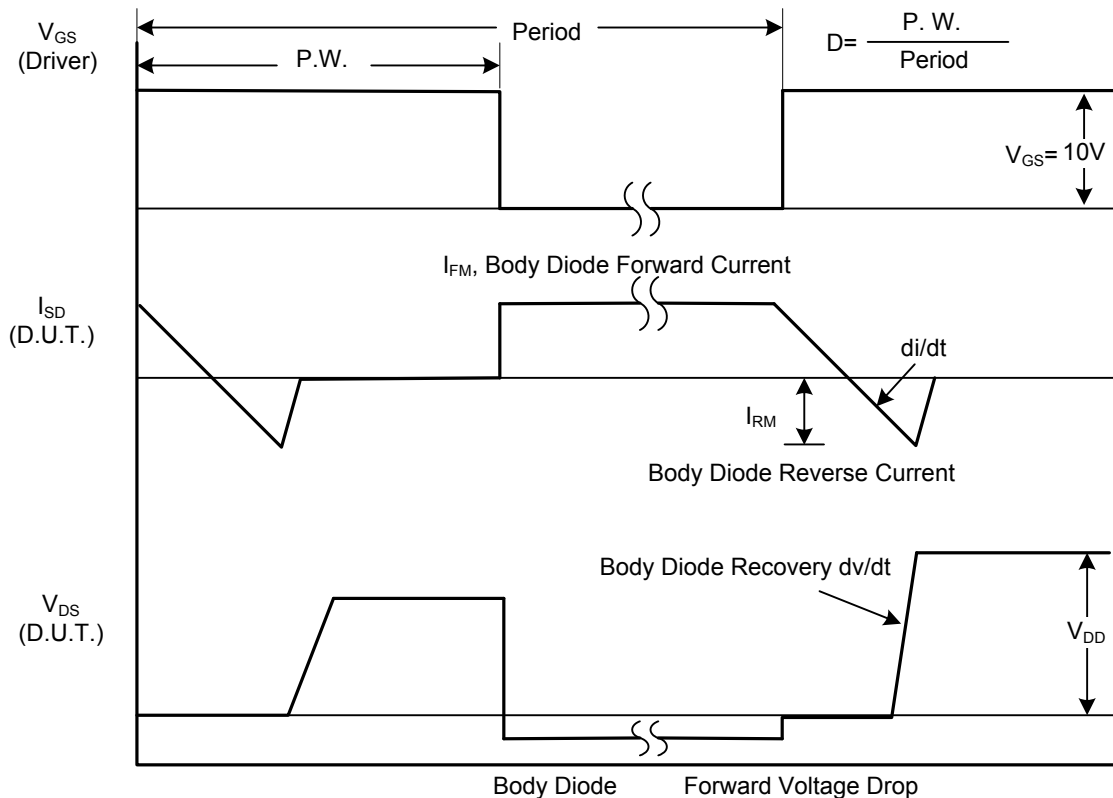
Notes: 1. Pulse Test: Pulse width $\leq 300\ \mu\text{s}$, Duty cycle $\leq 2\%$

2. Essentially independent of operating temperature

■ TEST CIRCUITS AND WAVEFORMS

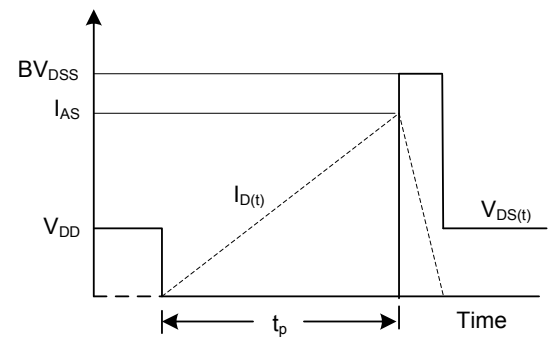
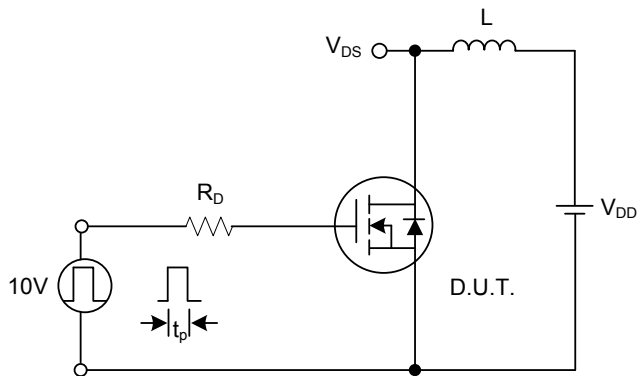
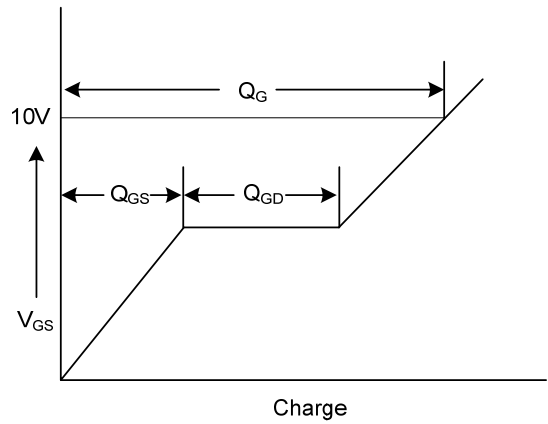
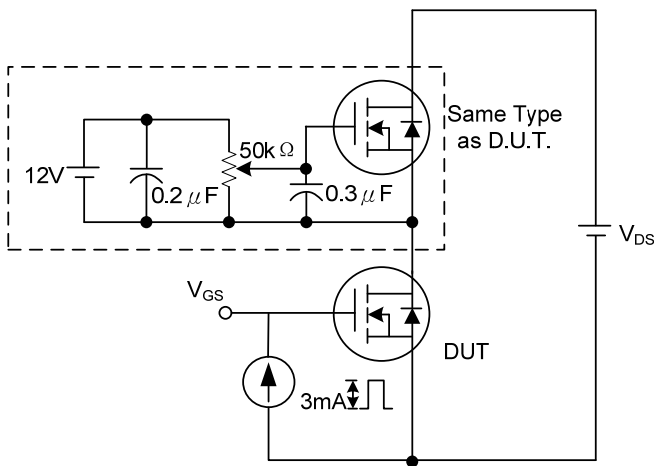
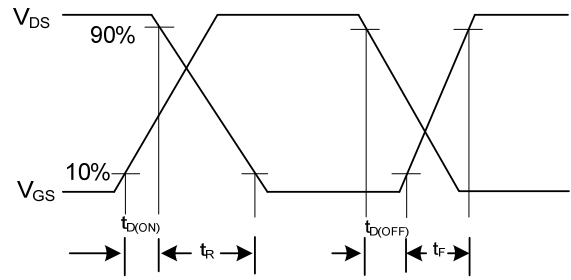
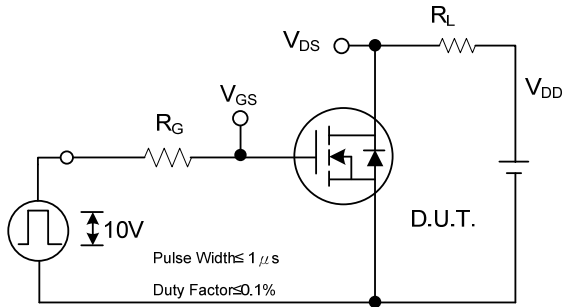


Peak Diode Recovery dv/dt Test Circuit

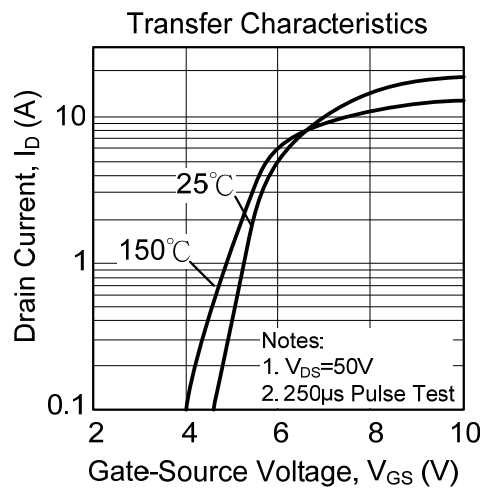
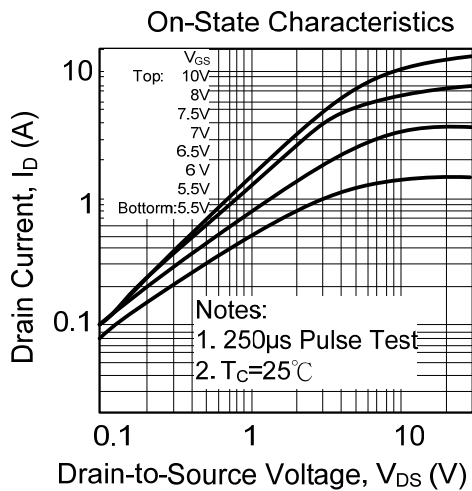
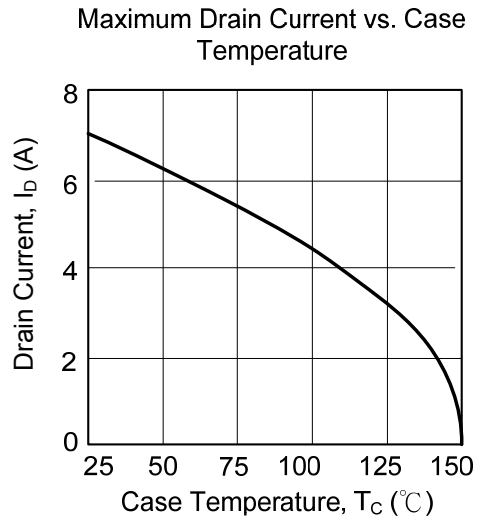
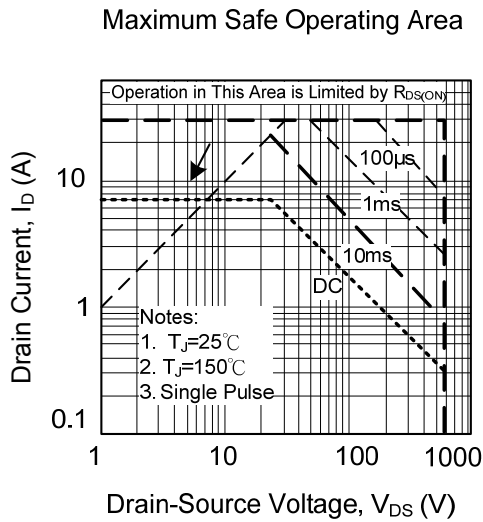
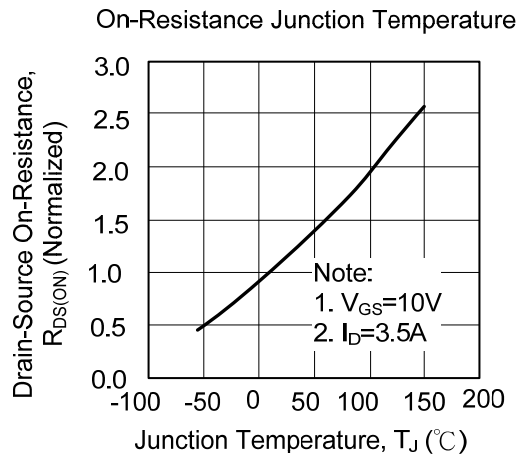
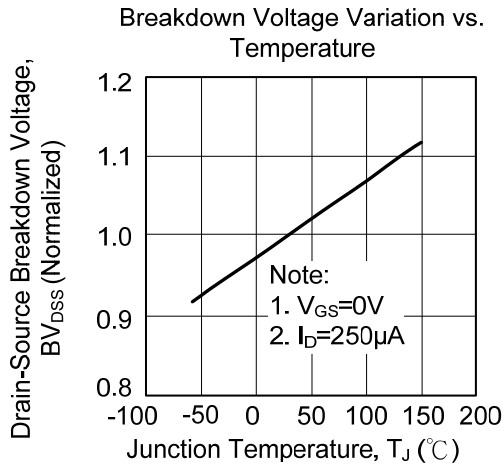


Peak Diode Recovery dv/dt Waveforms

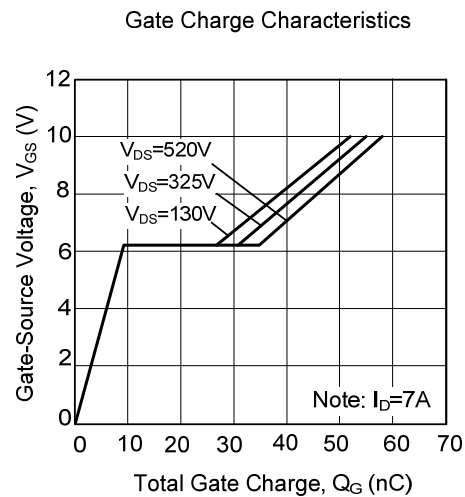
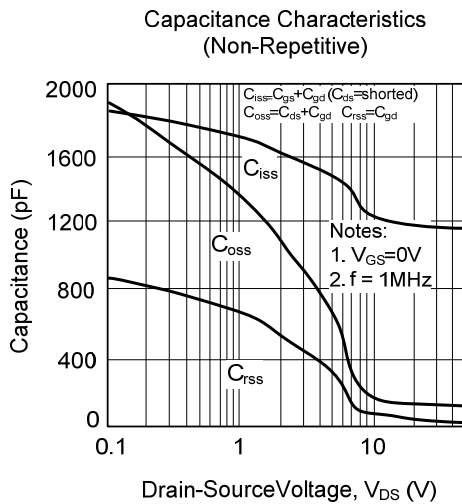
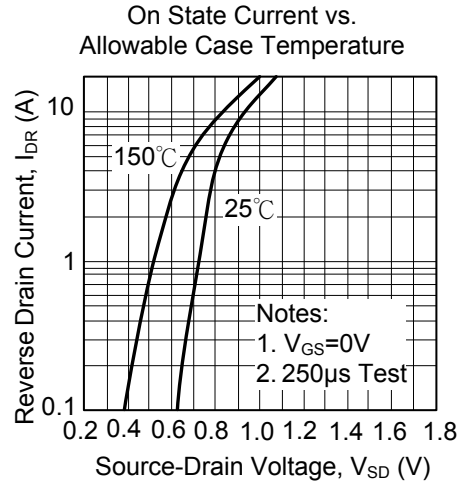
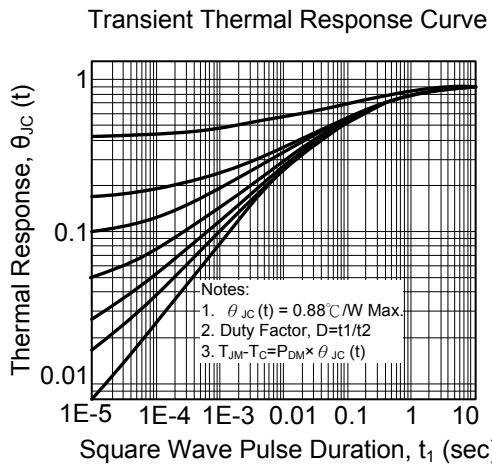
■ TEST CIRCUITS AND WAVEFORMS (Cont.)



■ TYPICAL CHARACTERISTICS



■ TYPICAL CHARACTERISTICS(Cont.)



UTC assumes no responsibility for equipment failures that result from using products at values that exceed, even momentarily, rated values (such as maximum ratings, operating condition ranges, or other parameters) listed in products specifications of any and all UTC products described or contained herein. UTC products are not designed for use in life support appliances, devices or systems where malfunction of these products can be reasonably expected to result in personal injury. Reproduction in whole or in part is prohibited without the prior written consent of the copyright owner. The information presented in this document does not form part of any quotation or contract, is believed to be accurate and reliable and may be changed without notice.