



## UTT13P04-H

Power MOSFET

### -13A, -40V P-CHANNEL POWER MOSFET

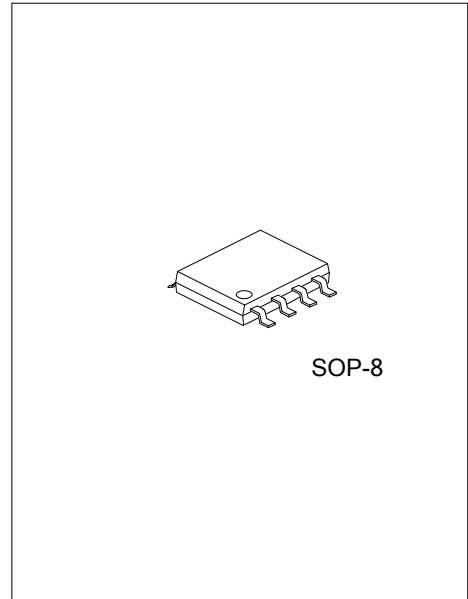
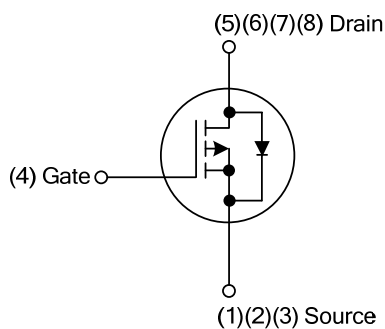
#### DESCRIPTION

The UTC **UTT13P04-H** is a P-channel power MOSFET using UTC's advanced technology to provide the customers with high switching speed and a minimum on-state resistance. It can also withstand high energy in the avalanche.

#### FEATURES

- \*  $R_{DS(ON)} < 12\text{ m}\Omega$  @  $V_{GS}=-10\text{V}$ ,  $I_D=-12\text{A}$
- \*  $R_{DS(ON)} < 17\text{ m}\Omega$  @  $V_{GS}=-4.5\text{V}$ ,  $I_D=-12\text{A}$
- \* Improved dv/dt capability
- \* Fast switching
- \* Green device available

#### SYMBOL



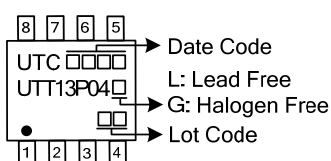
#### ORDERING INFORMATION

Ordering Number		Package	Pin Assignment						Packing		
Lead Free	Halogen Free		1	2	3	4	5	6		7	8
UTT13P04L-S08-R	UTT13P04G-S08-R	SOP-8	S	S	S	G	D	D	D	D	Tape Reel

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

<p>UTT13P04G-S08-R</p> <p>(1)Packing Type</p> <p>(2)Package Type</p> <p>(3)Green Package</p>	<p>(1) R: Tape Reel</p> <p>(2) S08: SOP-8</p> <p>(3) G: Halogen Free and Lead Free, L: Lead Free</p>
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#### MARKING



### ■ ABSOLUTE MAXIMUM RATINGS (T<sub>A</sub>=25°C, unless otherwise specified)

PARAMETER		SYMBOL	RATINGS	UNIT
Drain-Source Voltage		V <sub>DSS</sub>	-40	V
Gate-Source Voltage		V <sub>GSS</sub>	±20	V
Continuous Drain Current	Continuous	I <sub>D</sub>	-13	A
Pulsed Drain Current	Pulsed (Note 2)	I <sub>DM</sub>	-39	A
Avalanche Energy, Single Pulsed (Note 3)		E <sub>AS</sub>	58	mJ
Power Dissipation		P <sub>D</sub>	2.5	W
Junction Temperature		T <sub>J</sub>	+150	°C
Storage Temperature Range		T <sub>STG</sub>	-55 ~ +150	°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=-0.1mH, I<sub>AS</sub>=-34A, V<sub>DD</sub>=20V, R<sub>G</sub>=25 Ω, Starting T<sub>J</sub>=25°C

### ■ THERMAL DATA

PARAMETER	SYMBOL	RATINGS	UNIT
Junction to Ambient	θ <sub>JA</sub>	50	°C/W

Note: The data tested by surface mounted on a 1 inch<sup>2</sup> FR-4 board with 2OZ copper.

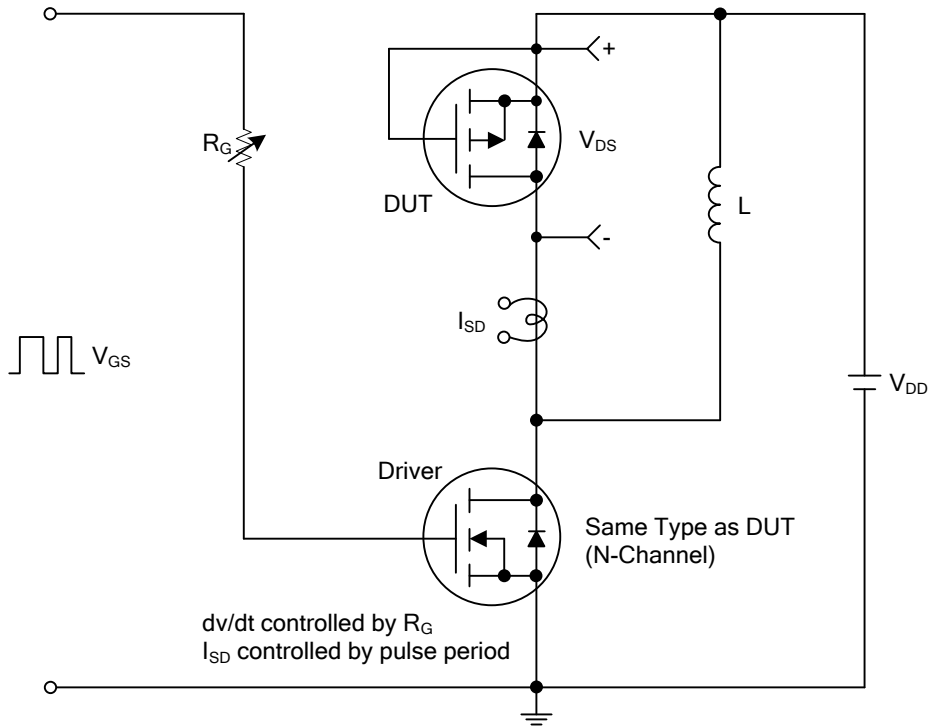
### ■ ELECTRICAL CHARACTERISTICS (T<sub>J</sub>=25°C, unless otherwise specified)

PARAMETER		SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
<b>OFF CHARACTERISTICS</b>							
Drain-Source Breakdown Voltage		BV <sub>DSS</sub>	V <sub>GS</sub> =0V, I <sub>D</sub> =250μA	-40			V
Drain-Source Leakage Current		I <sub>DSS</sub>	V <sub>DS</sub> =-40V, V <sub>GS</sub> =0V			-1	μA
Gate-Source Leakage Current	Forward	I <sub>GSS</sub>	V <sub>DS</sub> =0V, V <sub>GS</sub> =+20V			+100	nA
	Reverse		V <sub>DS</sub> =0V, V <sub>GS</sub> =-20V			-100	nA
<b>ON CHARACTERISTICS</b>							
Gate Threshold Voltage		V <sub>GS(TH)</sub>	V <sub>DS</sub> =V <sub>GS</sub> , I <sub>D</sub> =250μA	-1.0		-3.0	V
Drain-Source On-State Resistance		R <sub>DS(ON)</sub>	V <sub>GS</sub> =-10V, I <sub>D</sub> =-12A			12	mΩ
			V <sub>GS</sub> =-4.5V, I <sub>D</sub> =-12A			17	mΩ
<b>DYNAMIC PARAMETERS</b>							
Input Capacitance		C <sub>ISS</sub>	V <sub>DS</sub> =-20V, V <sub>GS</sub> =0V, f=1.0MHz		2900		pF
Output Capacitance		C <sub>OSS</sub>			330		pF
Reverse Transfer Capacitance		C <sub>RSS</sub>			220		pF
<b>SWITCHING PARAMETERS</b>							
Total Gate Charge (Note 1)		Q <sub>G</sub>	V <sub>DS</sub> =-32V, V <sub>GS</sub> =-10V, I <sub>D</sub> =-13A I <sub>G</sub> =-1mA (Note 1, 2)		58		nC
Gate to Source Charge		Q <sub>GS</sub>			14		nC
Gate to Drain Charge		Q <sub>GD</sub>			12		nC
Turn-on Delay Time (Note 1)		t <sub>D(ON)</sub>	V <sub>DD</sub> =-20V, V <sub>GS</sub> =-10V, I <sub>D</sub> =-13A, R <sub>G</sub> =-25Ω (Note 1, 2)		28		ns
Rise Time		t <sub>R</sub>			70		ns
Turn-off Delay Time		t <sub>D(OFF)</sub>			192		ns
Fall-Time		t <sub>F</sub>			170		ns
<b>SOURCE- DRAIN DIODE RATINGS AND CHARACTERISTICS</b>							
Maximum Body-Diode Pulsed Current		I <sub>S</sub>				-13	A
Drain-Source Diode Forward Voltage (Note 1)		I <sub>SM</sub>				-39	A
Maximum Body-Diode Continuous Current		V <sub>SD</sub>	I <sub>S</sub> =-12A, V <sub>GS</sub> =0V			-1.2	V

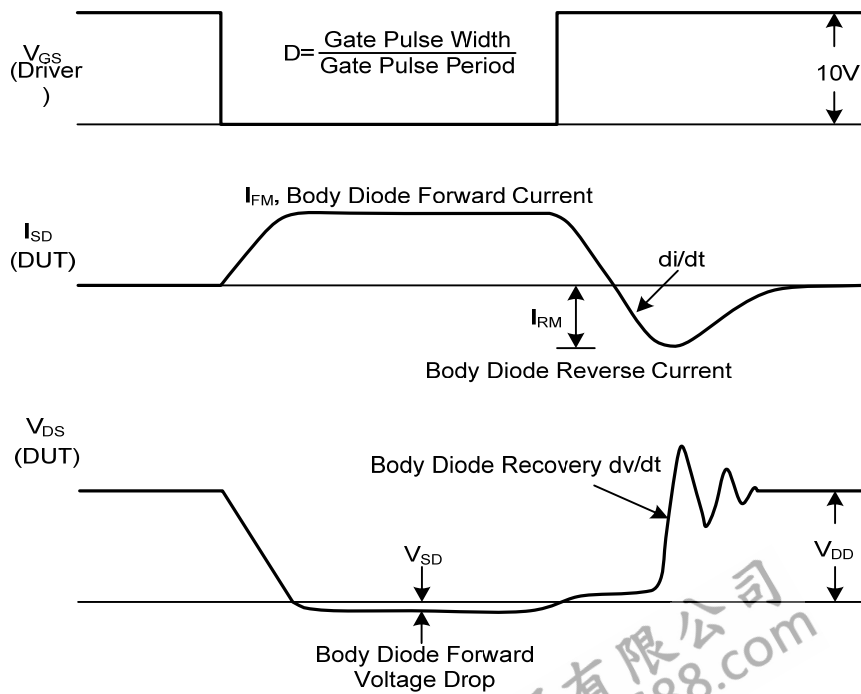
Note: 1. Pulse Test : Pulse width ≤ 400μs, Duty cycle ≤ 2%.

2. Essentially independent of operating temperature.

■ TEST CIRCUITS AND WAVEFORMS

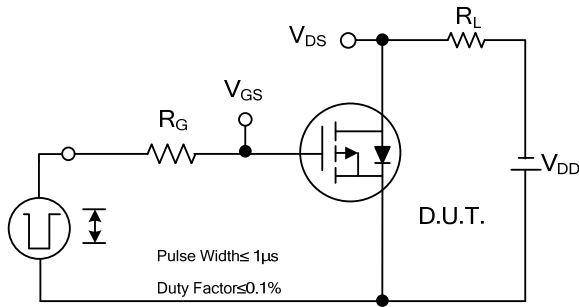


Peak Diode Recovery dv/dt Test Circuit

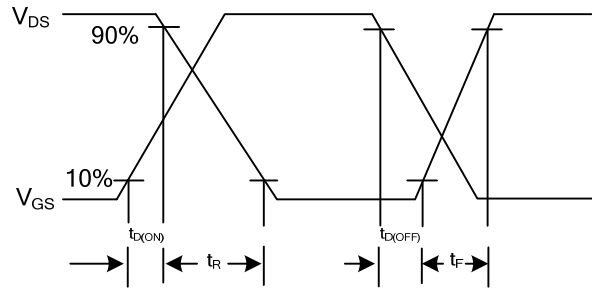


Peak Diode Recovery dv/dt Waveforms

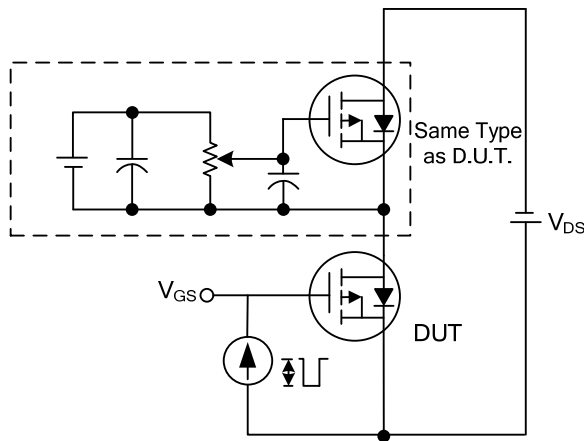
TEST CIRCUITS AND WAVEFORMS



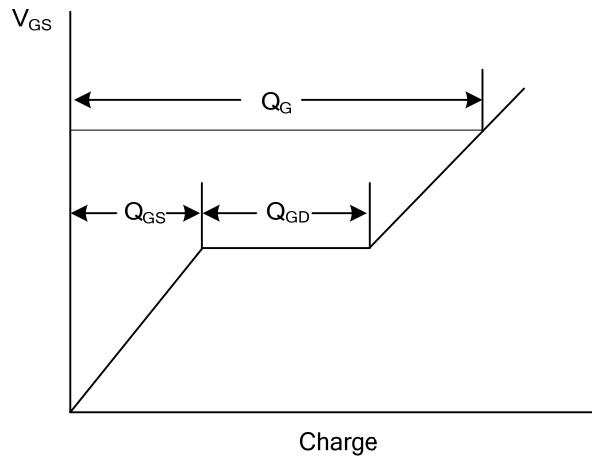
Switching Test Circuit



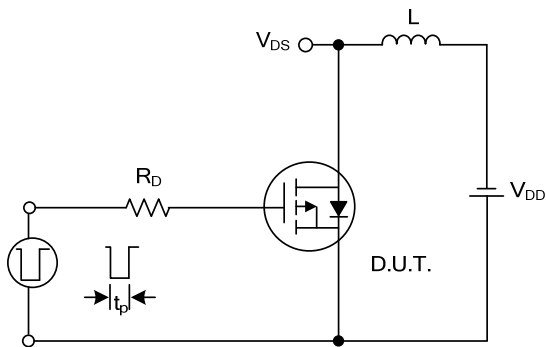
Switching Waveforms



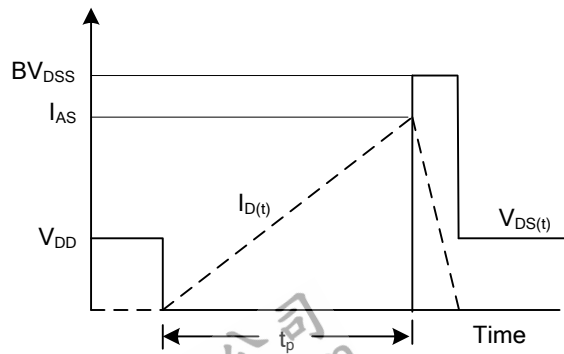
Gate Charge Test Circuit



Gate Charge Waveform

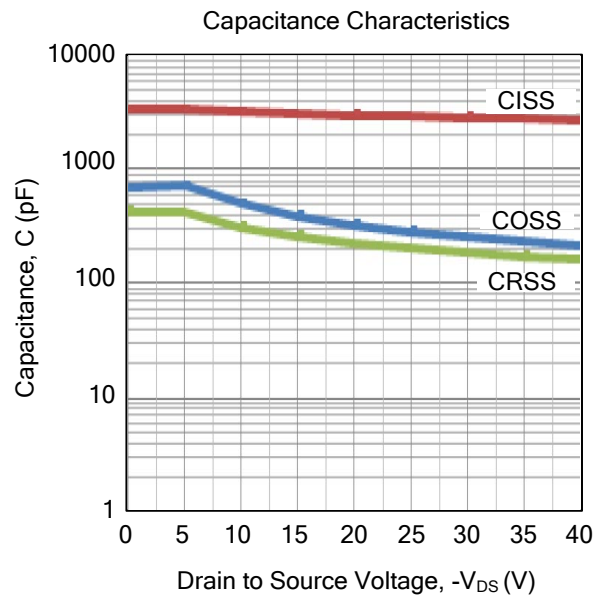
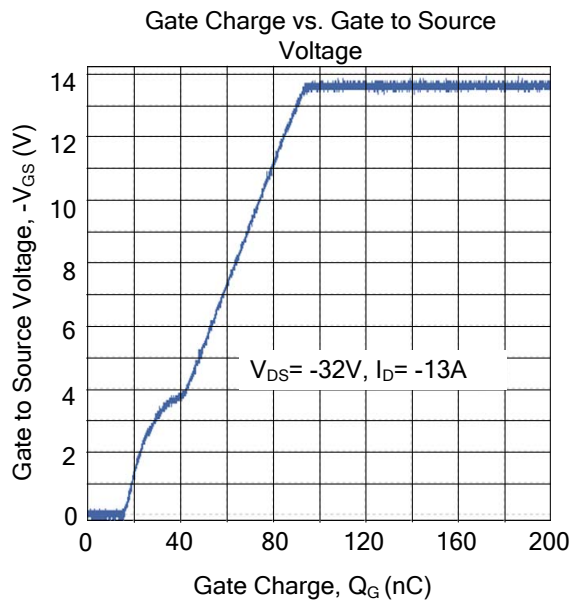


Unclamped Inductive Switching Test Circuit



Unclamped Inductive Switching Waveforms

### TYPICAL CHARACTERISTICS



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