



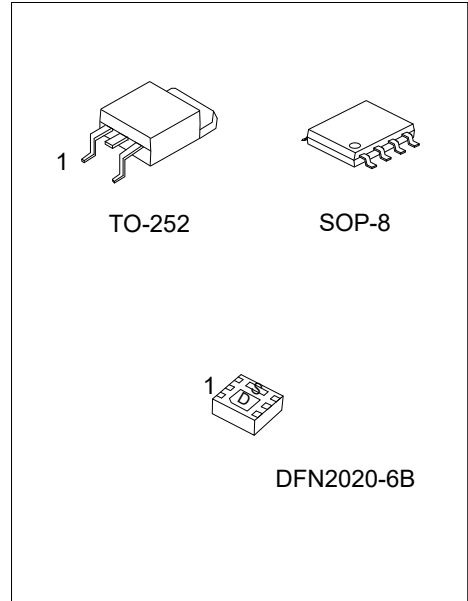
# UT4404

**Power MOSFET**

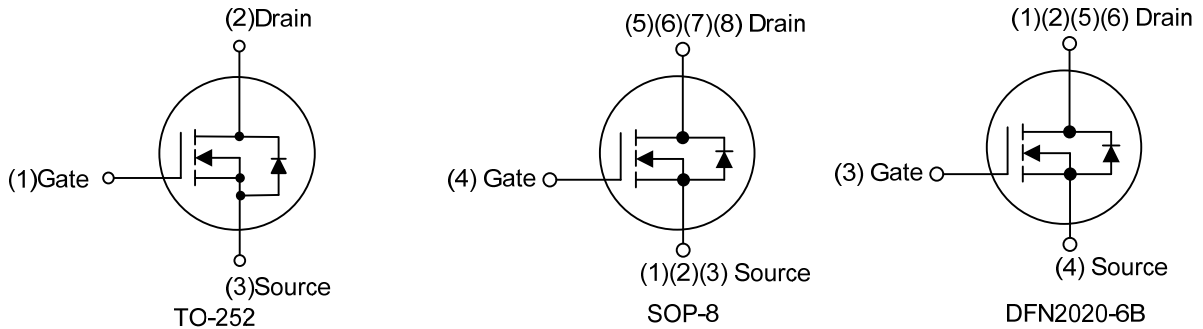
## N-CHANNEL ENHANCEMENT MODE

### DESCRIPTION

The UTC **UT4404** provide excellent  $R_{DS(ON)}$ , low gate charge and operation with gate voltages as low as 2.5V by using advanced trench technology. The UTC **UT4404** is suitable for use in PWM applications and as a load switch. Separating the source leads is to allow a Kelvin connection to the source to bypass the source inductance.



### SYMBOL



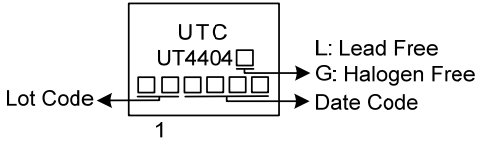
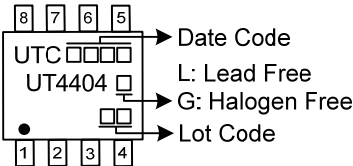
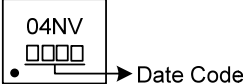
### ORDERING INFORMATION

Ordering Number		Package	Pin Assignment								Packing
Lead Free	Halogen Free		1	2	3	4	5	6	7	8	
UT4404L-TN3-R	UT4404G-TN3-R	TO-252	G	D	S	-	-	-	-	-	Tape Reel
UT4404L-S08-R	UT4404G-S08-R	SOP-8	S	S	S	G	D	D	D	D	Tape Reel
UT4404L-K06B-2020-R	UT4404G-K06B-2020-R	DFN2020-6B	D	D	G	S	D	D	-	-	Tape Reel

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

<p>UT4404G-TN3-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) TN3: TO-252, S08: SOP-8 K06B-2020: DFN2020-6B</p> <p>(3) G: Halogen Free and Lead Free L: Lead Free</p>
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■ MARKING

TO-252	SOP-8
 <p>UTC UT4404 □ □ □ □ □ □ □ □ □ 1</p> <p>Lot Code ← □ □ □ □ □ □ □ □ → Date Code</p> <p>L: Lead Free G: Halogen Free</p>	 <p>8 7 6 5 UTC □ □ □ □ □ □ □ □ UT4404 □ □ □ □ □ □ □ □ 1 2 3 4</p> <p>→ Date Code L: Lead Free G: Halogen Free → Lot Code</p>
DFN2020-6B	-
 <p>04NV □ □ □ □ □ □ □ □</p> <p>→ Date Code</p>	-

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

PARAMETER		SYMBOL	RATINGS	UNIT
Drain-Source Voltage		$V_{DS}$	30	V
Gate-Source Voltage		$V_{GS}$	$\pm 12$	V
Continuous Drain Current (Note 2)		$I_D$	8.5	A
Pulsed Drain Current (Note 2)		$I_{DM}$	17	A
Avalanche Energy	Single Pulsed (Note 3)	$E_{AS}$	7	mJ
Peak Diode Recovery dv/dt (Note 4)		dv/dt	1.5	V/ns
Power Dissipation	TO-252	$P_D$	3.125	W
	SOP-8		1	W
	DFN2020-6B		1.8	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 maximum junction temperature.

3.  $L = 0.1\text{mH}$ ,  $I_{AS} = 12.2\text{A}$ ,  $V_{DD} = 20\text{V}$ ,  $R_G = 25\Omega$ , Starting  $T_J = 25^{\circ}\text{C}$ .

4.  $I_{SD} \leq 8.5\text{A}$ ,  $di/dt \leq 200\text{A}/\mu\text{s}$ ,  $V_{DD} \leq BV_{DSS}$ , Starting  $T_J = 25^{\circ}\text{C}$ .

■ THERMAL DATA

PARAMETER		SYMBOL	RATINGS	UNIT
Junction to Ambient	TO-252	$\theta_{JA}$	40 (Note)	$^{\circ}\text{C}/\text{W}$
	SOP-8		125	$^{\circ}\text{C}/\text{W}$
	DFN2020-6B		69 (Note)	$^{\circ}\text{C}/\text{W}$

Note: Device mounted on FR-4 substrate PC board, 2oz copper, with 1inch square copper plate.

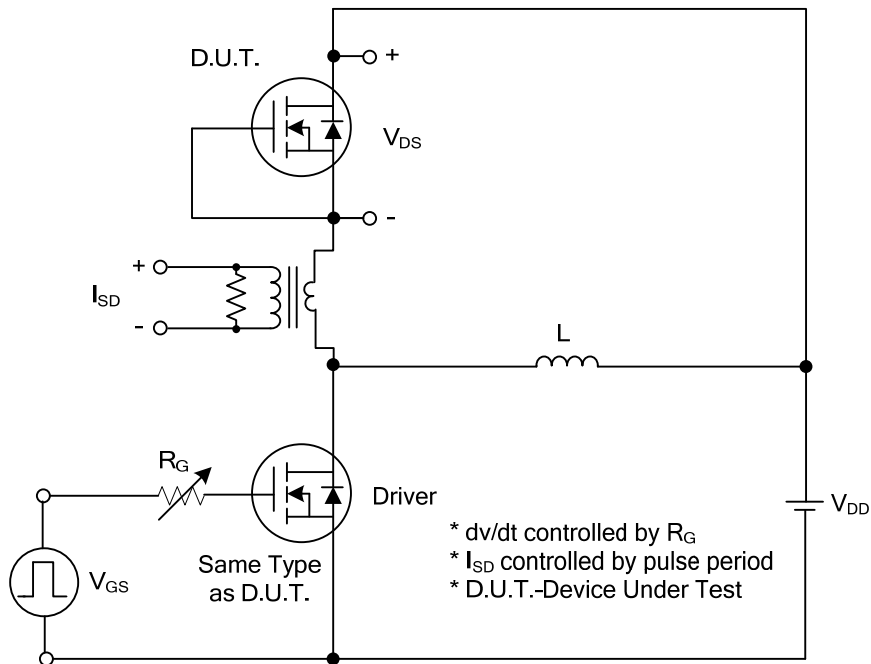
■ ELECTRICAL CHARACTERISTICS (T<sub>J</sub>=25°C, unless otherwise specified)

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
<b>STATIC PARAMETERS</b>						
Drain-Source Breakdown Voltage	BV <sub>DSS</sub>	V <sub>GS</sub> =0V, I <sub>D</sub> =250μA	30			V
Drain-Source Leakage Current	I <sub>DSS</sub>	V <sub>DS</sub> =24V, V <sub>GS</sub> =0V			1	μA
Gate-Source Leakage Current	I <sub>GSS</sub>	V <sub>DS</sub> =0V, V <sub>GS</sub> =±12V			±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	0.5		1.5	V
Static Drain-Source On-Resistance	R <sub>DS(ON)</sub>	V <sub>GS</sub> =10V, I <sub>D</sub> =8.5A			24	mΩ
		V <sub>GS</sub> =4.5V, I <sub>D</sub> =8.5A			30	mΩ
		V <sub>GS</sub> =2.5V, I <sub>D</sub> =5.0A			48	mΩ
<b>DYNAMIC PARAMETERS</b>						
Input Capacitance	C <sub>ISS</sub>	V <sub>DS</sub> = 15V, V <sub>GS</sub> =0V, f=1MHz		725		pF
Output Capacitance	C <sub>OSS</sub>			96		pF
Reverse Transfer Capacitance	C <sub>RSS</sub>			85		pF
<b>SWITCHING PARAMETERS</b>						
Total Gate Charge	Q <sub>G</sub>	V <sub>DS</sub> = 15V, V <sub>GS</sub> = 4.5V, I <sub>D</sub> = 8.5A		22		nC
Gate-Source Charge	Q <sub>GS</sub>			3.8		nC
Gate-Drain Charge	Q <sub>GD</sub>			5.6		nC
Turn-ON Delay Time	t <sub>D(ON)</sub>	V <sub>GS</sub> =10V, V <sub>DS</sub> =15V R <sub>L</sub> =1.8Ω, R <sub>G</sub> =6Ω		4		ns
Turn-ON Rise Time	t <sub>r</sub>			18		ns
Turn-OFF Delay Time	t <sub>D(OFF)</sub>			25		ns
Turn-OFF Fall-Time	t <sub>f</sub>			19		ns
<b>DRAIN-SOURCE DIODE CHARACTERISTICS AND MAXIMUM RATINGS</b>						
Maximum Continuous Drain-Source Diode Forward Current	I <sub>S</sub>				8.5	A
Maximum Pulsed Drain-Source Diode Forward Current	I <sub>SM</sub>				17	A
Diode Forward Voltage	V <sub>SD</sub>	V <sub>GS</sub> =0V, I <sub>S</sub> =1.0A			1	V
Body Diode Reverse Recovery Time	t <sub>rr</sub>	I <sub>F</sub> =5.0A, dI/dt =100A/μs		124		ns
Body Diode Reverse Recovery Charge	Q <sub>rr</sub>				140	

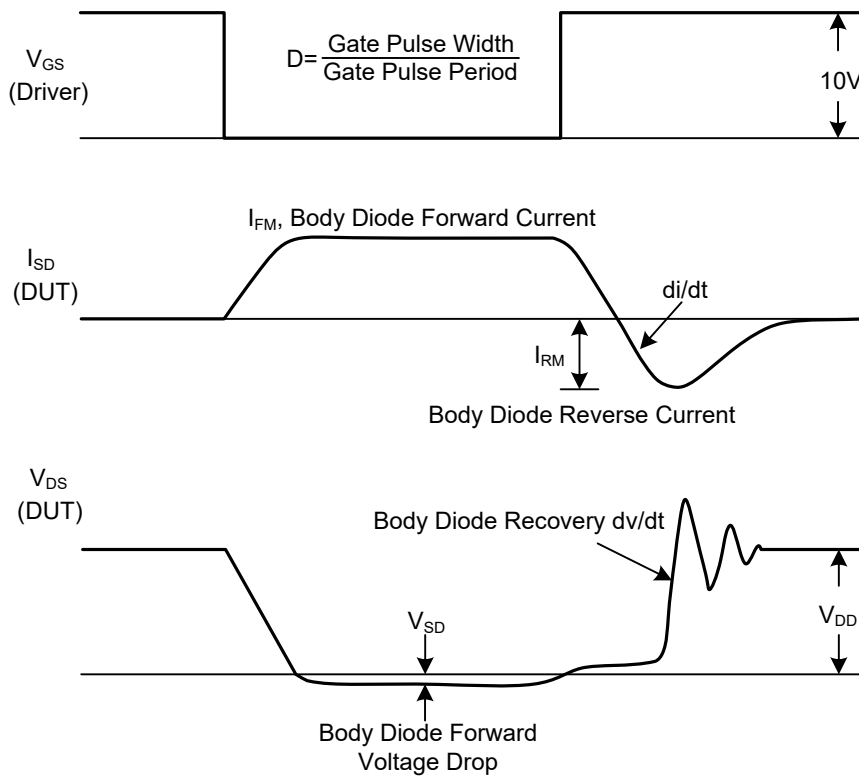
Notes: 1. Pulse Test: Pulse width ≤ 300μs, Duty cycle ≤ 2%.

2. Essentially independent of operating ambient temperature.

■ TEST CIRCUITS AND WAVEFORMS

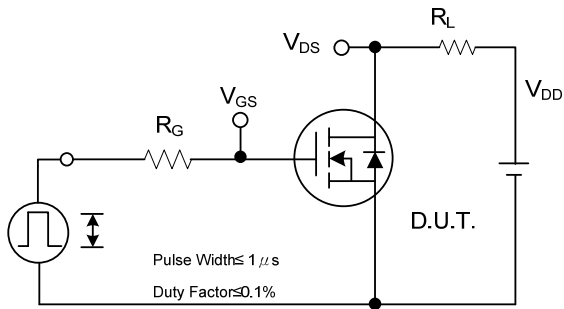


Peak Diode Recovery dv/dt Test Circuit

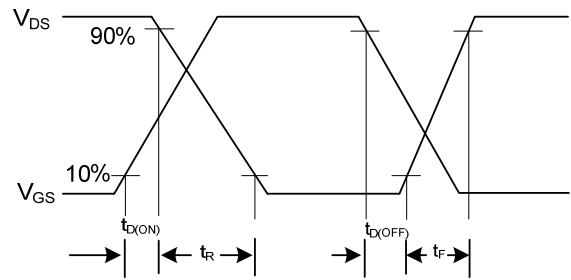


Peak Diode Recovery dv/dt Waveforms

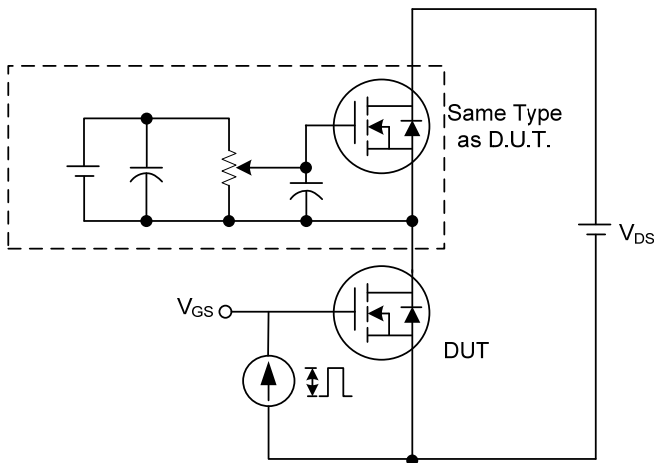
■ TEST CIRCUITS AND WAVEFORMS



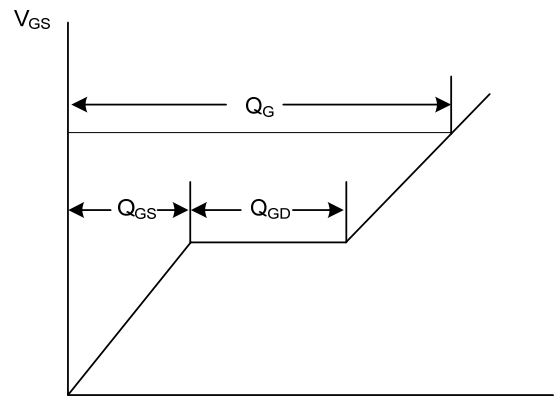
Switching Test Circuit



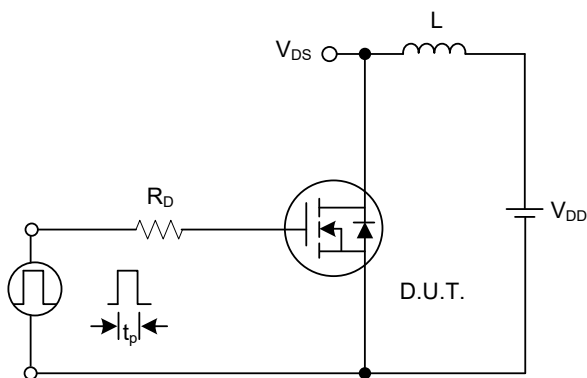
Switching Waveforms



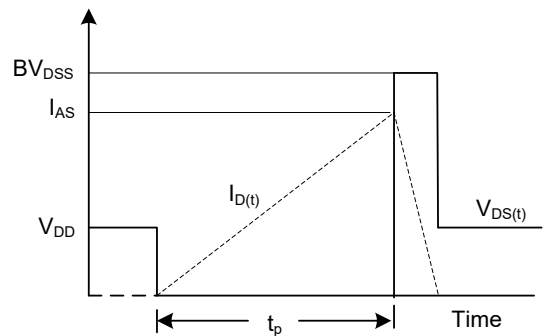
Gate Charge Test Circuit



Charge  
Gate Charge Waveform



Unclamped Inductive Switching Test Circuit



Unclamped Inductive Switching Waveforms

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