



## UT1333

Power MOSFET

### -550mA, -20V P-CHANNEL POWER MOSFET

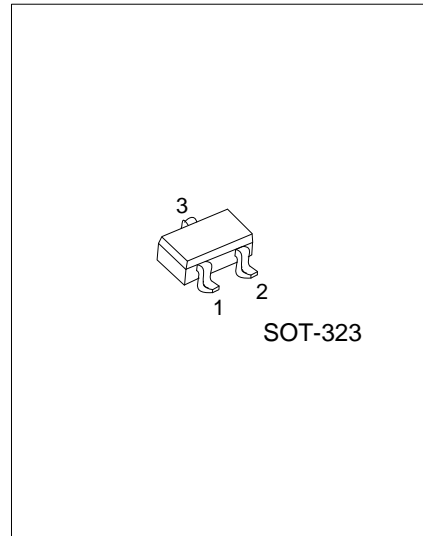
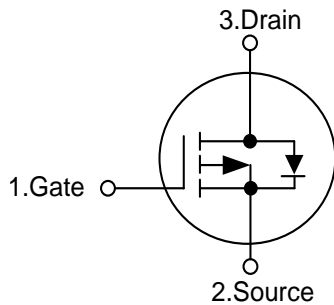
#### DESCRIPTION

The UT1333 uses advanced proprietary, planar stripe, DMOS technology to provide excellent  $R_{DS(ON)}$ , low gate charge and operation with low gate voltages. This device is suitable to be used in low voltage applications such as audio amplifier, high efficiency switching DC/DC converters, and DC motor control.

#### FEATURES

- \*  $R_{DS(ON)} \leq 600m\Omega$  @  $V_{GS}=-10V, I_D=-550mA$
- \*  $R_{DS(ON)} \leq 800m\Omega$  @  $V_{GS}=-4.5V, I_D=-500mA$
- \*  $R_{DS(ON)} \leq 1000m\Omega$  @  $V_{GS}=-2.5V, I_D=-300mA$
- \* Low capacitance
- \* Low gate charge
- \* Fast switching capability
- \* Avalanche energy specified

#### SYMBOL



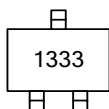
#### ORDERING INFORMATION

Ordering Number		Package	Pin Assignment			Packing
Lead Free	Halogen Free		1	2	3	
UT1333L-AL3-R	UT1333G-AL3-R	SOT-323	G	S	D	Tape Reel

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

<p>UT1333G-AL3-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) AL3: SOT-323</p> <p>(3) G: Halogen Free and Lead Free, L: Lead Free</p>
--	--

#### MARKING



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

PARAMETER		SYMBOL	RATINGS	UNIT
Drain-Source Voltage		V <sub>DSS</sub>	-20	V
Gate-Source Voltage		V <sub>GSS</sub>	±12	V
Continuous Drain Current	Continuous	I <sub>D</sub>	-550	mA
Pulsed Drain Current	Pulsed (Note 2)	I <sub>DM</sub>	-2200	mA
Power Dissipation (T <sub>A</sub> =25°C)		P <sub>D</sub>	0.35	W
Junction Temperature		T <sub>J</sub>	+150	°C
Storage Temperature		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.

## ■ THERMAL CHARACTERISTICS

PARAMETER	SYMBOL	RATING	UNIT
Junction to Ambient	θ <sub>JA</sub>	360	°C/W

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

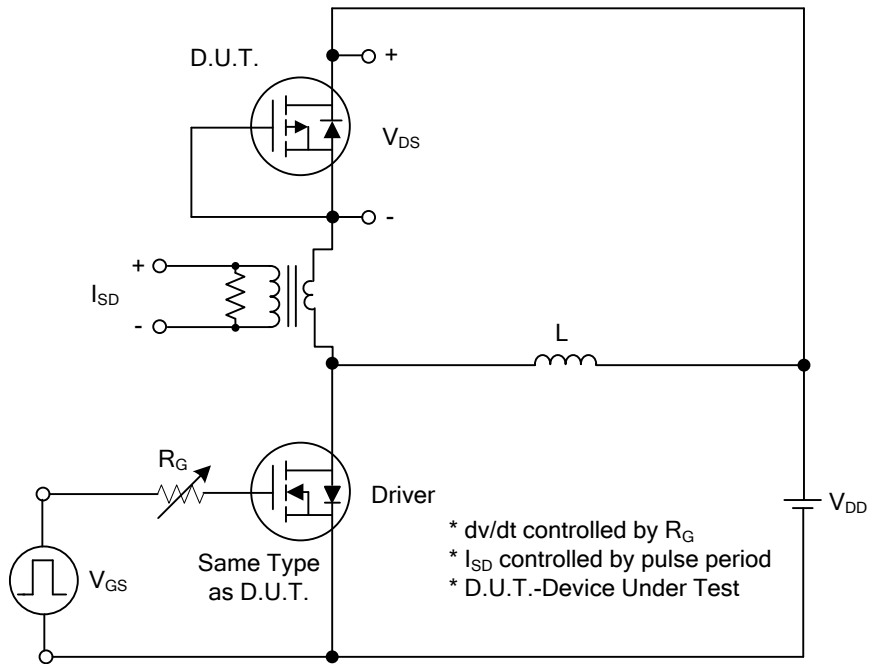
## ■ ELECTRICAL CHARACTERISTICS (T<sub>J</sub>=25°C, unless otherwise specified)

PARAMETER		SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
<b>OFF CHARACTERISTICS</b>							
Drain-Source Breakdown Voltage		BV <sub>DSS</sub>	V <sub>GS</sub> =0 V, I <sub>D</sub> =-250μA	-20			V
Drain-Source Leakage Current		I <sub>DSS</sub>	V <sub>DS</sub> =-20V, 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> =+12V			100	nA
	Reverse		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	-0.4		-1.2	V
Static Drain-Source On-Resistance		R <sub>DS(ON)</sub>	V <sub>GS</sub> =-10V, I <sub>D</sub> =-550mA			600	mΩ
			V <sub>GS</sub> =-4.5V, I <sub>D</sub> =-500mA			800	mΩ
			V <sub>GS</sub> =-2.5V, I <sub>D</sub> =-300mA			1000	mΩ
<b>DYNAMIC PARAMETERS</b>							
Input Capacitance		C <sub>ISS</sub>	V <sub>DS</sub> =-15V, V <sub>GS</sub> =0V, f=1.0MHz		110		pF
Output Capacitance		C <sub>OSS</sub>			20		pF
Reverse Transfer Capacitance		C <sub>RSS</sub>			14		pF
<b>SWITCHING PARAMETERS</b>							
Total Gate Charge (Note 1)		Q <sub>G</sub>	V <sub>DS</sub> =-16V, V <sub>GS</sub> =-4.5V, I <sub>D</sub> =-0.55A I <sub>G</sub> =-1mA (Note 1, 2)		4.8		nC
Gate Source Charge		Q <sub>GS</sub>			1.4		nC
Gate Drain Charge		Q <sub>GD</sub>			0.7		nC
Turn-ON Delay Time (Note 1)		t <sub>D(ON)</sub>	V <sub>DD</sub> =-10V, V <sub>GS</sub> =-4.5V, I <sub>D</sub> =-0.55A, R <sub>G</sub> =25Ω (Note 1, 2)		14		ns
Turn-ON Rise Time		t <sub>r</sub>			24		ns
Turn-OFF Delay Time		t <sub>D(OFF)</sub>			48		ns
Turn-OFF Fall-Time		t <sub>f</sub>			24		ns
<b>SOURCE- DRAIN DIODE RATINGS AND CHARACTERISTICS</b>							
Maximum Body-Diode Continuous Current		I <sub>S</sub>				-550	mA
Maximum Pulsed Drain-Source Diode Forward Current		I <sub>SM</sub>				-2200	mA
Diode Forward Voltage (Note 1)		V <sub>SD</sub>	I <sub>S</sub> =-300mA, V <sub>GS</sub> =0V			-1.2	V

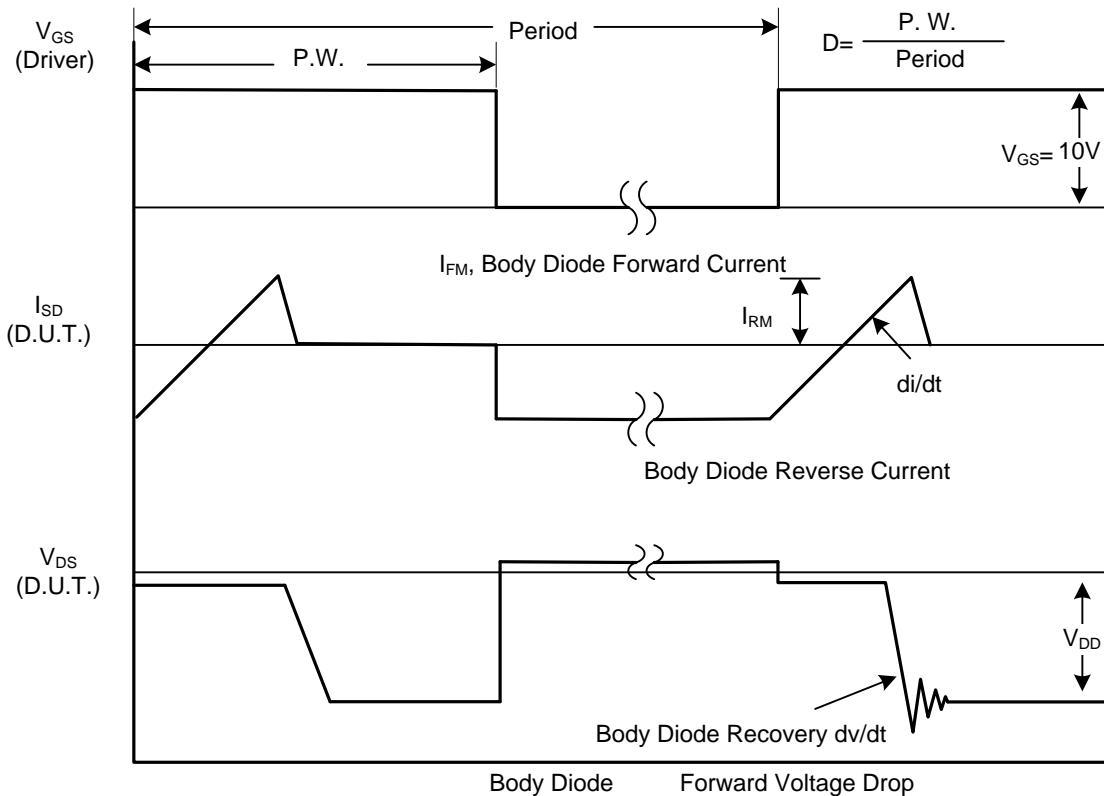
Notes: 1. Pulse Test : Pulse width ≤ 300μs, Duty cycle ≤ 2%.

2. Essentially independent of operating temperature.

■ TEST CIRCUITS AND WAVEFORMS

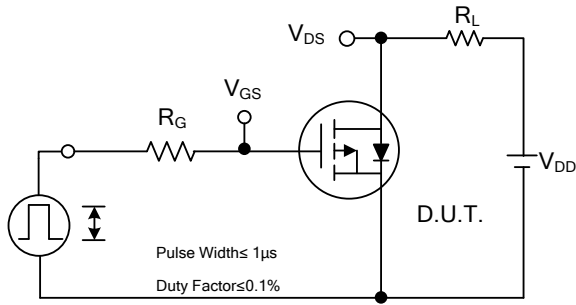


Peak Diode Recovery  $dv/dt$  Test Circuit

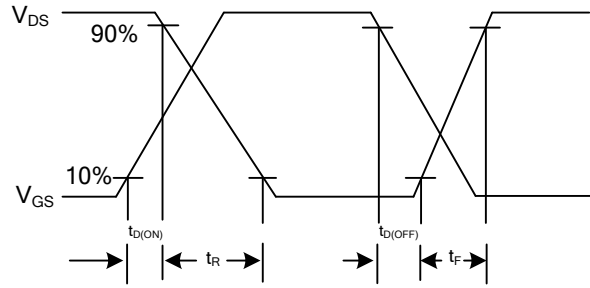


Peak Diode Recovery  $dv/dt$  Waveforms

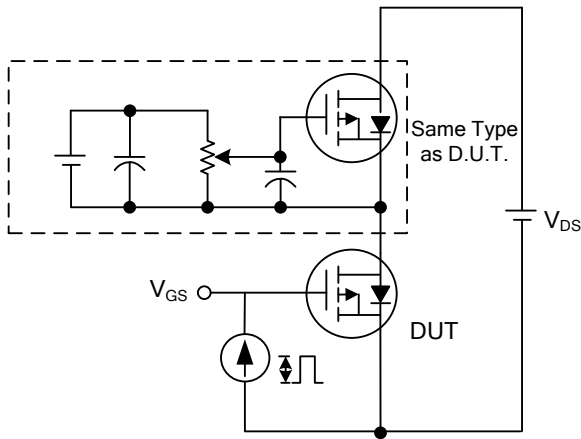
■ TEST CIRCUITS AND WAVEFORMS



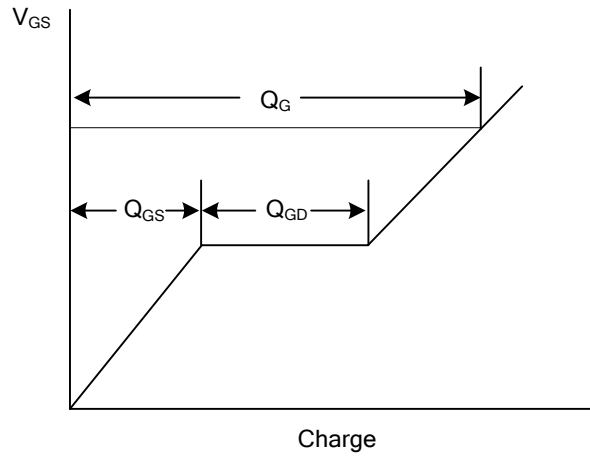
Switching Test Circuit



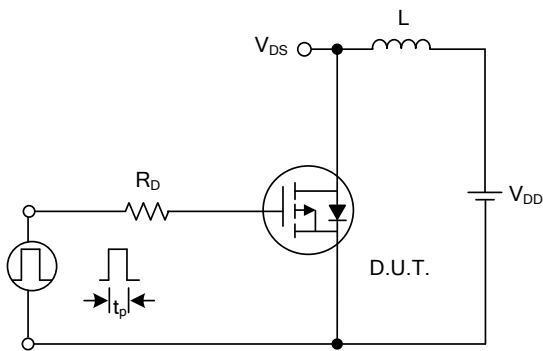
Switching Waveforms



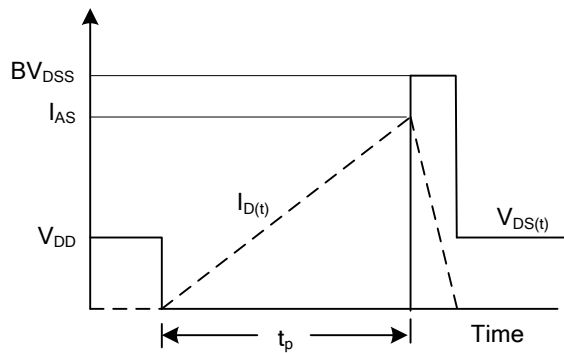
Gate Charge Test Circuit



Gate Charge Waveform

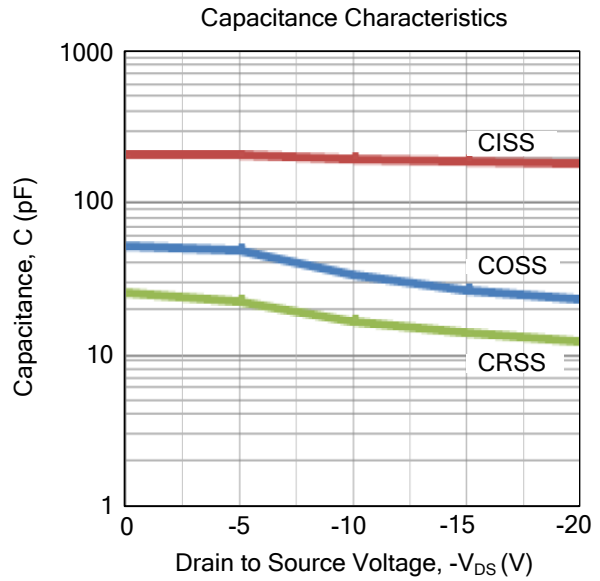
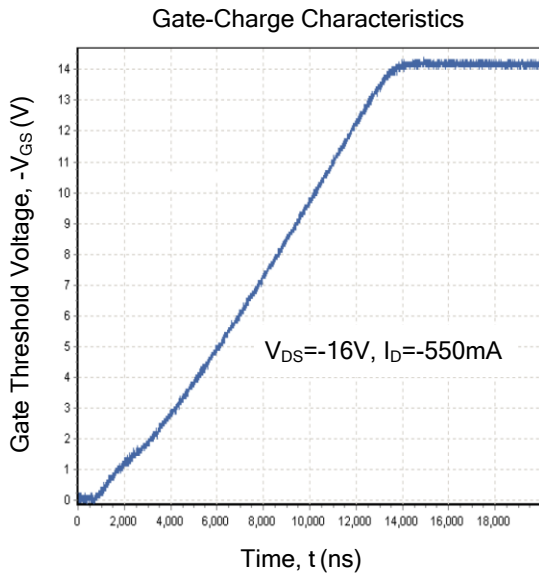


Unclamped Inductive Switching Test Circuit



Unclamped Inductive Switching Waveforms

■ TYPICAL CHARACTERISTICS



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. UTC reserves the right to make changes to information published in this document, including without limitation specifications and product descriptions, at any time and without notice. This document supersedes and replaces all information supplied prior to the publication hereof.