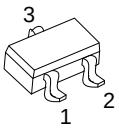
UT1333

Power MOSFET

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



SOT-323

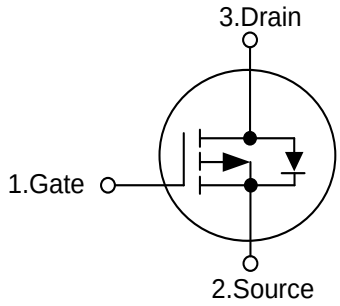
■ DESCRIPTION

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

* $R_{DS(ON)}$ ≤ 600mΩ @ V_{GS}=-10V, I_D=-550mA
  $R_{DS(ON)}$ ≤ 800mΩ @ V_{GS}=-4.5V, I_D=-500mA
  $R_{DS(ON)}$ ≤ 1000mΩ @ 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

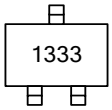
UT1333G-AL3-R

(1)Packing Type — (1) R: Tape Reel

(2)Package Type — (2) AL3: SOT-323

(3)Green Package — (3) G: Halogen Free and Lead Free, L: Lead Free

■ MARKING



■ ABSOLUTE MAXIMUM RATINGS (T_C=25°C, unless otherwise specified)

PARAMETER		SYMBOL	RATINGS	UNIT
Drain-Source Voltage		V_{DSS}	-20	V
Gate-Source Voltage		V_{GSS}	±12	V
Continuous Drain Current	Continuous	I_D	-550	mA
Pulsed Drain Current	Pulsed (Note 2)	I_{DM}	-2200	mA
Power Dissipation (T_A=25°C)		P_D	0.35	W
Junction Temperature		T_J	+150	°C
Storage Temperature		T_{STG}	-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_{JA}	360	°C/W

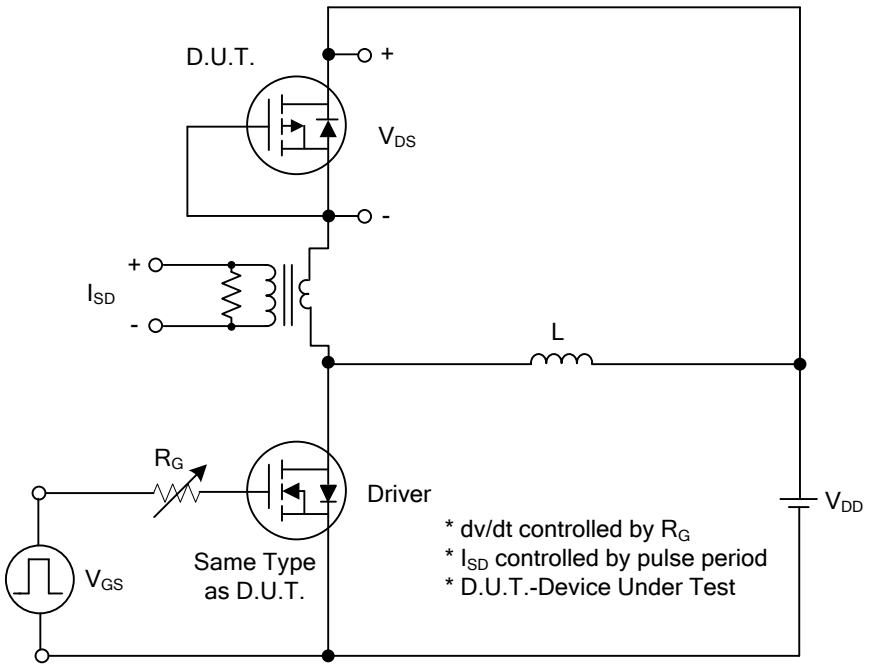
Note: The data tested by surface mounted on a 1 inch^2 FR-4 board with 2OZ copper.

■ ELECTRICAL CHARACTERISTICS (T_J =25°C, unless otherwise specified)

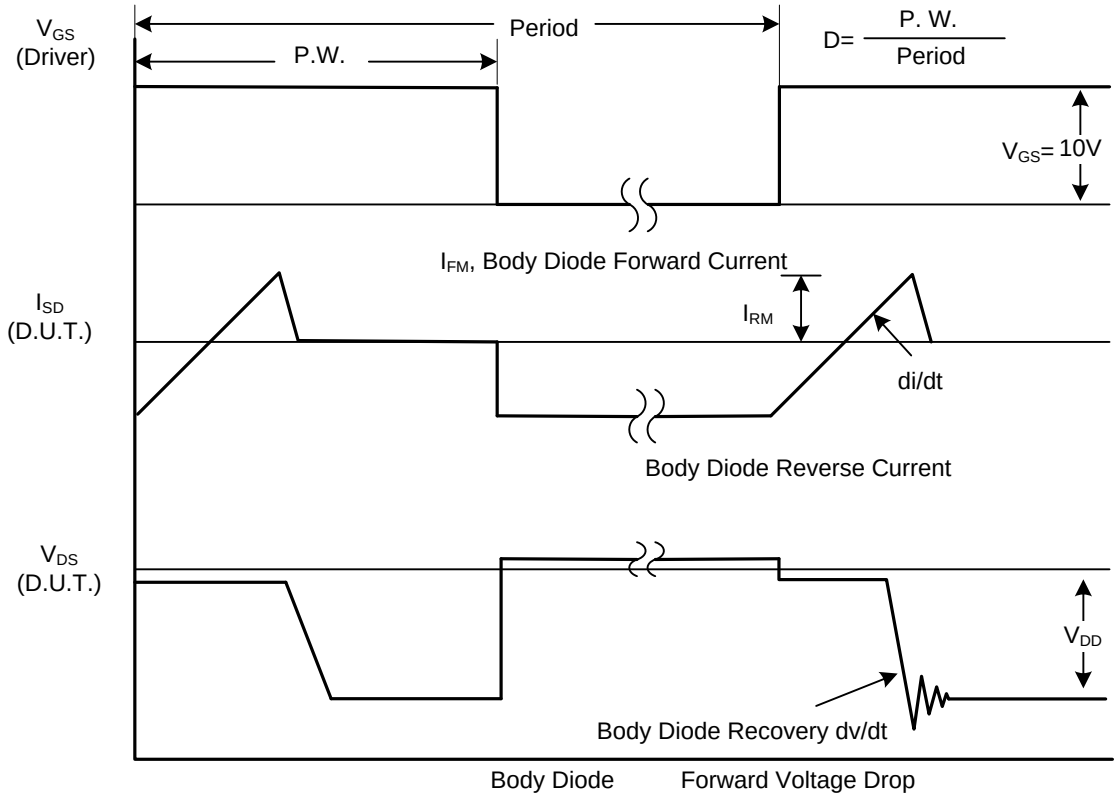
PARAMETER		SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
OFF CHARACTERISTICS							
Drain-Source Breakdown Voltage		BV_{DSS}	V_{GS}=0 V, I_D=-250μA	-20			V
Drain-Source Leakage Current		I_{DSS}	V_{DS}=-20V, V_{GS}=0V			-1	μA
Gate-Source Leakage Current	Forward	I_{GSS}	V_{DS}=0V, V_{GS}=+12V			100	nA
	Reverse		V_{DS}=0V, V_{GS}=-12V			-100	nA
ON CHARACTERISTICS							
Gate Threshold Voltage		$V_{GS(TH)}$	V_{DS}=V_{GS}, I_D=-250μA	-0.4		-1.2	V
Static Drain-Source On-Resistance		$R_{DS(ON)}$	V_{GS}=-10V, I_D=-550mA			600	mΩ
			V_{GS}=-4.5V, I_D=-500mA			800	mΩ
			V_{GS}=-2.5V, I_D=-300mA			1000	mΩ
DYNAMIC PARAMETERS							
Input Capacitance		C_{ISS}	V_{DS}=-15V, V_{GS}=0V, f=1.0MHz		110		pF
Output Capacitance		C_{OSS}			20		pF
Reverse Transfer Capacitance		C_{RSS}			14		pF
SWITCHING PARAMETERS							
Total Gate Charge (Note 1)		Q_G	V_{DS}=-16V, V_{GS}=-4.5V, I_D=-0.55A I_G=-1mA (Note 1, 2)		4.8		nC
Gate Source Charge		Q_{GS}			1.4		nC
Gate Drain Charge		Q_{GD}			0.7		nC
Turn-ON Delay Time (Note 1)		$t_{D(ON)}$	V_{DD}=-10V, V_{GS}=-4.5V, I_D=-0.55A, R_G=25Ω (Note 1, 2)		14		ns
Turn-ON Rise Time		t_R			24		ns
Turn-OFF Delay Time		$t_{D(OFF)}$			48		ns
Turn-OFF Fall-Time		t_F			24		ns
SOURCE- DRAIN DIODE RATINGS AND CHARACTERISTICS							
Maximum Body-Diode Continuous Current		I_S				-550	mA
Maximum Pulsed Drain-Source Diode Forward Current		I_{SM}				-2200	mA
Diode Forward Voltage (Note 1)		V_{SD}	I_S=-300mA, V_{GS}=0V			-1.2	V

Notes: 1. Pulse Test : Pulse width ≤ 300μs, Duty cycle ≤ 2%.
2. Essentially independent of operating temperature.

■ TEST CIRCUITS AND WAVEFORMS

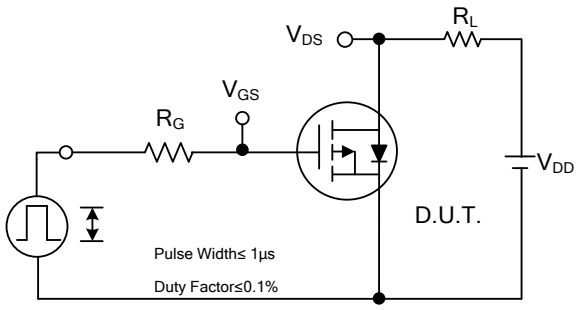


Peak Diode Recovery dv/dt Test Circuit

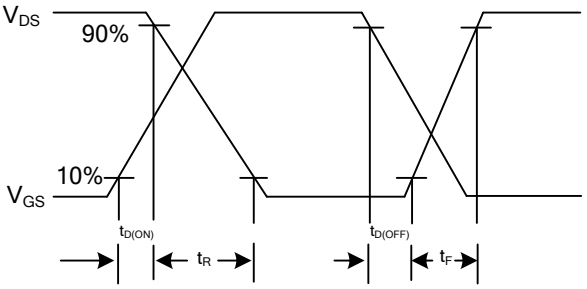


Peak Diode Recovery dv/dt Waveforms

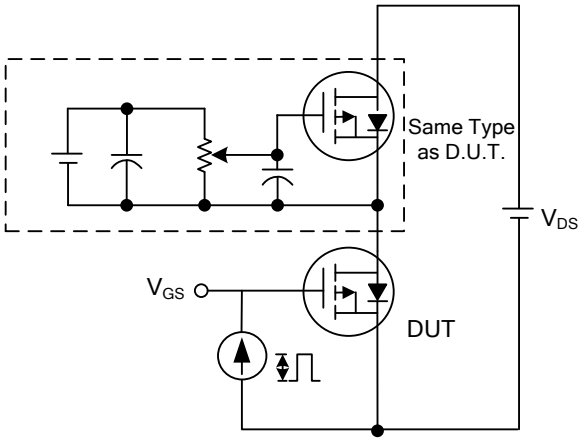
■ TEST CIRCUITS AND WAVEFORMS



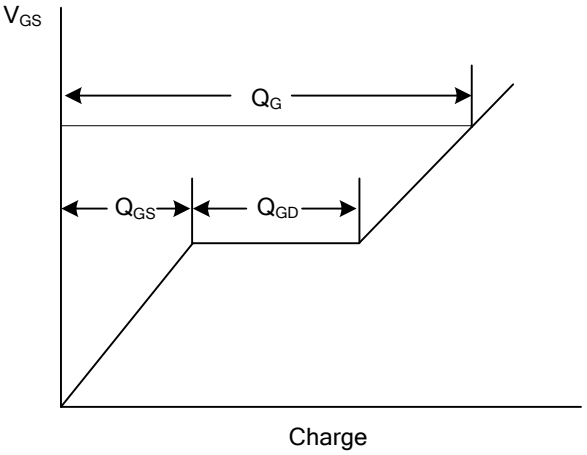
Switching Test Circuit



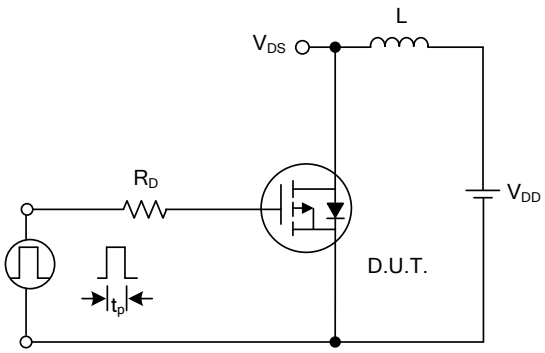
Switching Waveforms



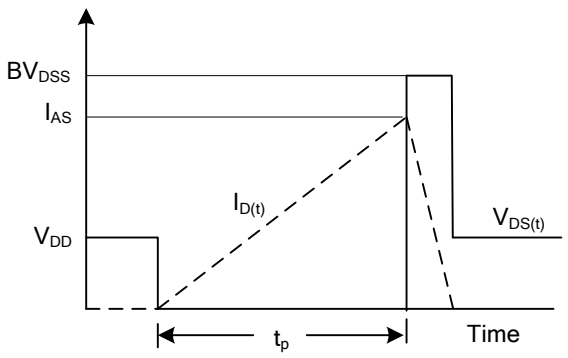
Gate Charge Test Circuit



Gate Charge Waveform



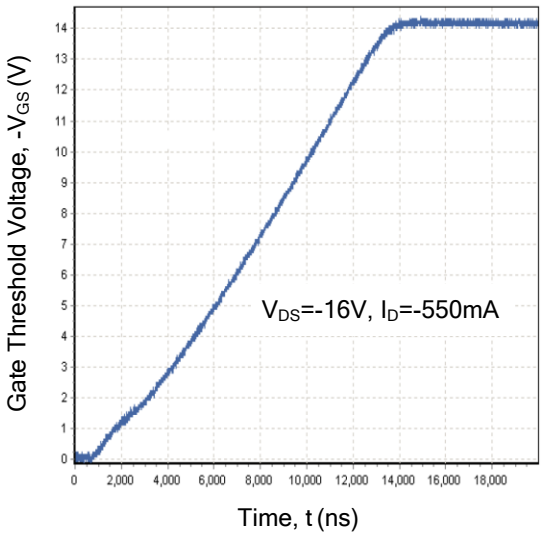
Unclamped Inductive Switching Test Circuit



Unclamped Inductive Switching Waveforms

■ TYPICAL CHARACTERISTICS

Gate-Charge Characteristics



Capacitance Characteristics