



## UFR9120

Preliminary

Power MOSFET

### P CHANNEL POWER MOSFET

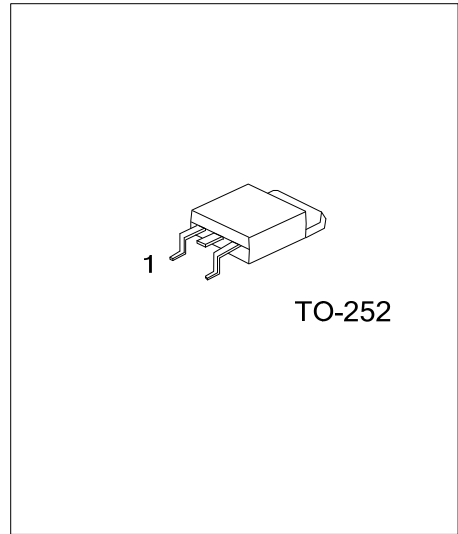
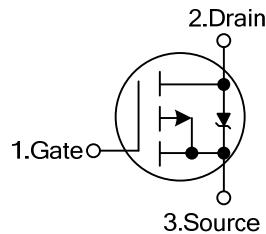
#### DESCRIPTION

The UTC **UFR9120** is a P-channel power MOSFET using UTC's advanced processing technology to provide customers a minimum on-state resistance and high switching speed

#### FEATURES

- \* Fully Avalanche Rated
- \* High Switching Speed
- \* extremely Low On-Resistance
- \* Surface Mount

#### SYMBOL



#### ORDERING INFORMATION

Ordering Number		Package	Pin Assignment			Packing
Lead Free	Halogen Free		1	2	3	
UFR9120L-TN3-R	UFR9120G-TN3-R	TO-252	G	D	S	Tape Reel
UFR9120L-TN3-T	UFR9120G-TN3-T	TO-252	G	D	S	Tube

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

<p>UFR9120L-TN3-R</p> <p>(1)Packing Type</p> <p>(2)Package Type</p> <p>(3)Lead Free</p>	<p>(1) R: Tape Reel, T: Tube</p> <p>(2) TN3: TO-252</p> <p>(3) G: Halogen Free, L: Lead Free</p>
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■ ABSOLUTE MAXIMUM RATINGS( $T_C = 25^\circ\text{C}$ , unless otherwise specified)

PARAMETER		SYMBOL	RATINGS	UNIT	
Drain-Source Voltage		$V_{DSS}$	-100	V	
Gate-Source Voltage		$V_{GSS}$	$\pm 20$	V	
Drain Current, $V_{GS}@-10\text{V}$	Continuous	$I_D$	$T_C=25^\circ\text{C}$	-6.6	A
			$T_C=100^\circ\text{C}$	-4.2	A
	Pulsed (Note 2)		$I_{DM}$	-26	A
Avalanche Current (Note 2)		$I_{AR}$	-6.6	A	
Avalanche Energy	Single Pulsed (Note 3)	$E_{AS}$	100	mJ	
	Repetitive (Note 2)	$E_{AR}$	4.0	mJ	
Peak Diode Recovery $dv/dt$ (Note 4)		$dv/dt$	-5.0	V/ns	
Power Dissipation $T_C=25^\circ\text{C}$		$P_D$	40	W	
Linear Derating Factor			0.32	W/ $^\circ\text{C}$	
Junction Temperature		$T_J$	+150	$^\circ\text{C}$	
Storage Temperature		$T_{STG}$	-55~+150	$^\circ\text{C}$	

Note: 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 max. junction temperature.(See Fig.11)
3. Starting  $T_J=25^\circ\text{C}$ ,  $L=13\text{mH}$   $R_G=25\Omega$ ,  $I_{AS}=-3.9\text{A}$  (See Fig.12)
4.  $I_{SD} \leq -4.0\text{A}$ ,  $di/dt \leq 300\text{A}/\mu\text{s}$ ,  $V_{DD} \leq V_{(BR)DSS}$ ,  $T_J \leq 25^\circ\text{C}$

■ THERMAL DATA

PARAMETER	SYMBOL	RATINGS	UNIT
Junction to Ambient	$\theta_{JA}$	110	$^\circ\text{C}/\text{W}$
Junction to Case	$\theta_{JC}$	3.1	$^\circ\text{C}/\text{W}$

Note: 1. For recommended footprint and soldering techniques refer to application note

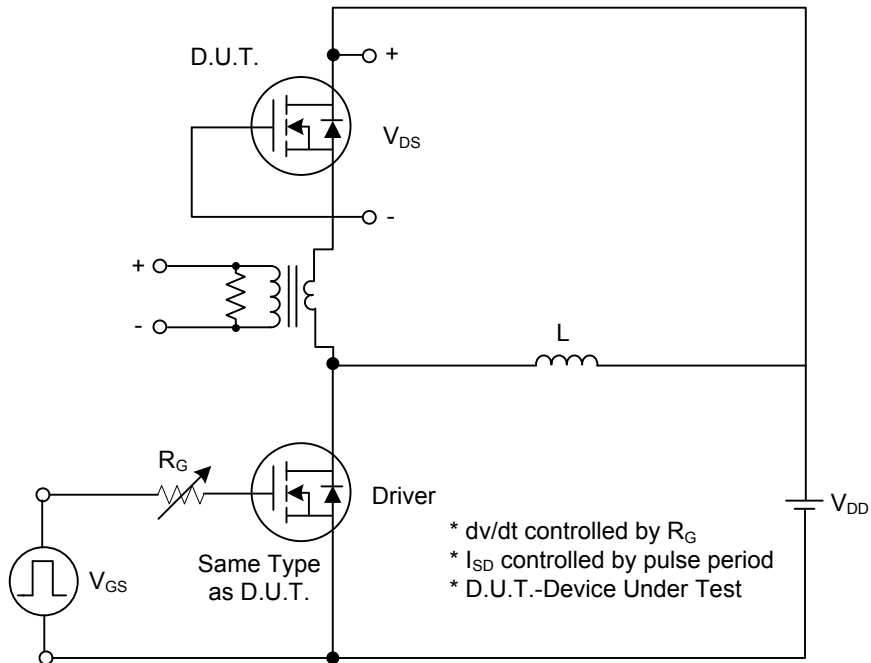
■ ELECTRICAL CHARACTERISTICS (T<sub>J</sub>=25°C, unless otherwise specified)

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
<b>OFF CHARACTERISTICS</b>						
Drain-Source Breakdown Voltage	BV <sub>DSS</sub>	I <sub>D</sub> =250μA, V <sub>GS</sub> =0V	-100			V
Breakdown Voltage Temperature Coefficient	ΔBV <sub>DSS</sub> /ΔT <sub>J</sub>	Reference to 25°C, I <sub>D</sub> =-1mA		-0.11		V/°C
Drain-Source Leakage Current	I <sub>DSS</sub>	V <sub>DS</sub> =-100V, V <sub>GS</sub> =0V			-25	μA
		V <sub>DS</sub> =-80V, V <sub>GS</sub> =0V, T <sub>J</sub> =150°C			-250	
Gate- Source Leakage Current	Forward	I <sub>GSS</sub>				nA
	Reverse					
						-100
		V <sub>GS</sub> =-20V				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	-2.0		-4.0	V
Static Drain-Source On-State Resistance	R <sub>DS(ON)</sub>	V <sub>GS</sub> =-10V, I <sub>D</sub> =-3.9A			0.48	Ω
<b>DYNAMIC PARAMETERS</b>						
Input Capacitance	C <sub>ISS</sub>	V <sub>GS</sub> =0V, V <sub>DS</sub> =-25V, f=1.0MHz		350		pF
Output Capacitance	C <sub>OSS</sub>			110		pF
Reverse Transfer Capacitance	C <sub>RSS</sub>			70		pF
<b>SWITCHING PARAMETERS</b>						
Total Gate Charge	Q <sub>G</sub>	V <sub>GS</sub> =-10V, V <sub>DS</sub> =-80V, I <sub>D</sub> =-4.0A (Note 1, 2)			27	nC
Gate to Source Charge	Q <sub>GS</sub>				5.0	nC
Gate to Drain Charge	Q <sub>GD</sub>				15	nC
Turn-ON Delay Time	t <sub>D(ON)</sub>	V <sub>DD</sub> =-50V, I <sub>D</sub> = -4.0A, R <sub>G</sub> = 12Ω, R <sub>D</sub> =12Ω (Note 1, 2)		14		ns
Rise Time	t <sub>R</sub>			47		ns
Turn-OFF Delay Time	t <sub>D(OFF)</sub>			28		ns
Fall-Time	t <sub>F</sub>			31		ns
<b>SOURCE- DRAIN DIODE RATINGS AND CHARACTERISTICS</b>						
Maximum Body-Diode Continuous Current	I <sub>S</sub>	MOSFET symbol showing the integral reverse p-n junction diode			-6.6	A
Maximum Body-Diode Pulsed Current (Note 1)	I <sub>SM</sub>				-26	A
Drain-Source Diode Forward Voltage	V <sub>SD</sub>	I <sub>S</sub> =-3.9A, V <sub>GS</sub> =0V, T <sub>J</sub> =25°C			-2.0	V
Body Diode Reverse Recovery Time	t <sub>RR</sub>	I <sub>F</sub> =-4.0A, V <sub>GS</sub> =0V, di/dt = 100A/μs,		100	150	ns
Body Diode Reverse Recovery Charge	Q <sub>RR</sub>	T <sub>J</sub> =25°C (Note 1)		420	630	nC

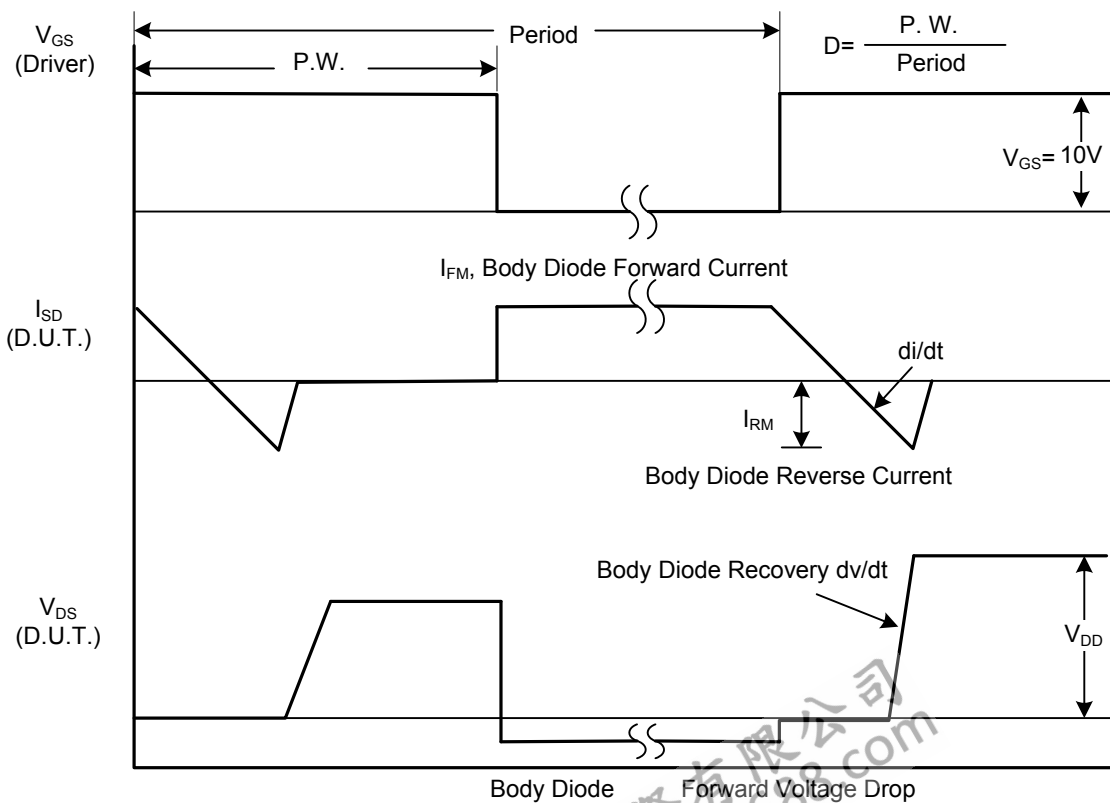
Notes: 1. Pulse Width ≤ 300μs, Duty Cycle ≤ 2%.

2. Essentially independent of operating temperature.

■ TEST CIRCUITS AND WAVEFORMS

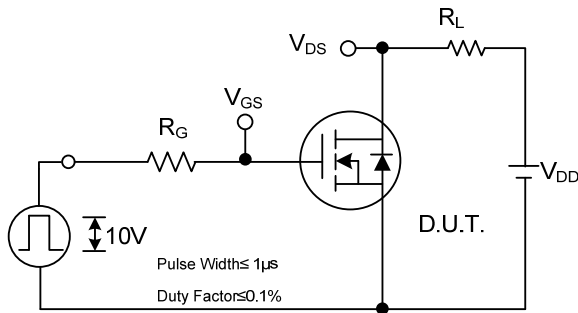


Peak Diode Recovery  $dv/dt$  Test Circuit

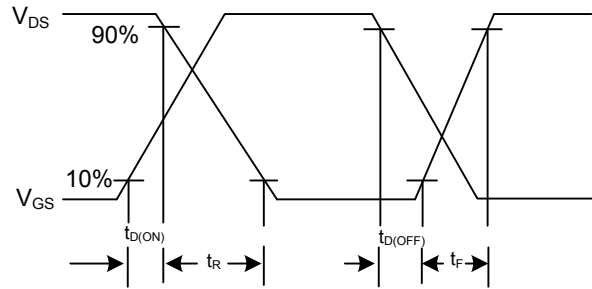


Peak Diode Recovery  $dv/dt$  Waveforms

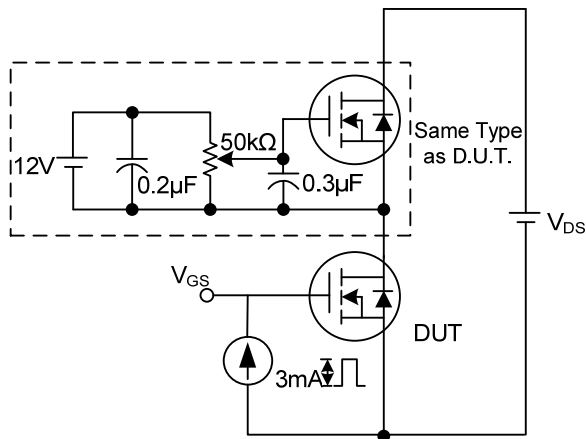
■ TEST CIRCUITS AND WAVEFORMS(Cont.)



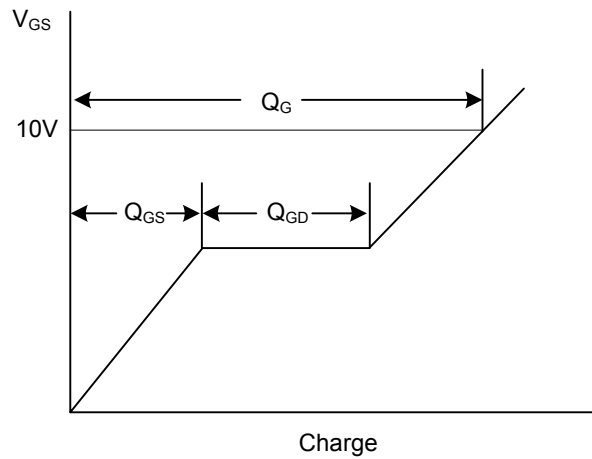
Switching Test Circuit



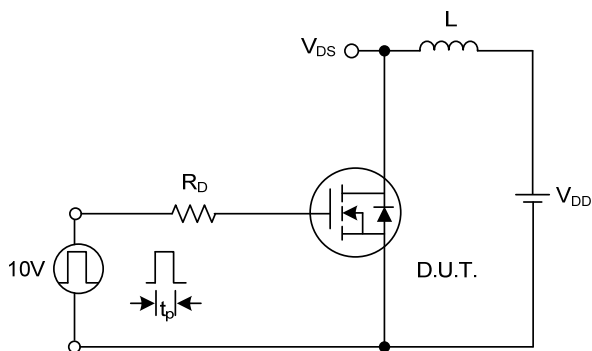
Switching Waveforms



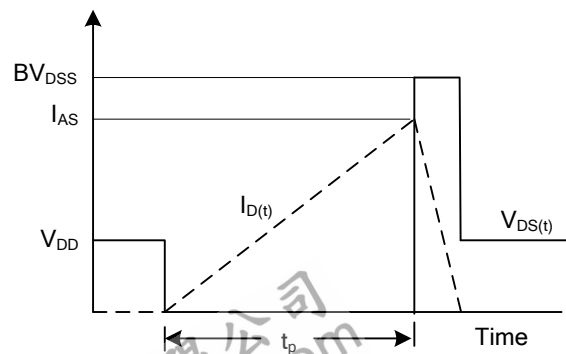
Gate Charge Test Circuit



Gate Charge Waveform



Unclamped Inductive Switching Test Circuit



Unclamped Inductive Switching Waveforms

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