

**UT9P02**

Preliminary

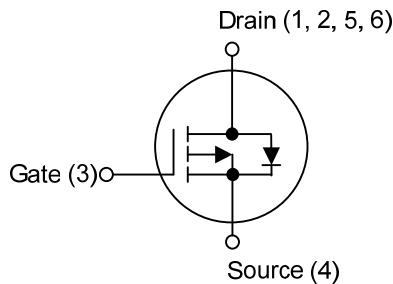
Power MOSFET**-9.0A, -20V P-CHANNEL
POWER MOSFET****DESCRIPTION**

The UTC **UT9P02** is a P-channel MOSFET, it uses UTC's advanced technology to provide the customers with a minimum on state resistance and low gate charge, etc.

The UTC **UT9P02** is suitable for load switch and battery protection applications.

FEATURES

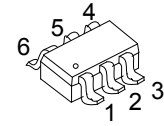
- * $R_{DS(ON)} \leq 23 \text{ m}\Omega$ @ $V_{GS} = -4.5\text{V}$, $I_D = -4.5\text{A}$
- $R_{DS(ON)} \leq 32 \text{ m}\Omega$ @ $V_{GS} = -2.5\text{V}$, $I_D = -4.5\text{A}$
- $R_{DS(ON)} \leq 45 \text{ m}\Omega$ @ $V_{GS} = -1.8\text{V}$, $I_D = -2.5\text{A}$
- * Improved dv/dt capability
- * Fast switching
- * Suit for -1.8V gate drive applications

SYMBOL**ORDERING INFORMATION**

Ordering Number		Package	Pin Assignment						Packing
Lead Free	Halogen Free		1	2	3	4	5	6	
UT9P02L-AG6-R	UT9P02G-AG6-R	SOT-26	D	D	G	S	D	D	Tape Reel
UT9P02L-K06B-2020-R	UT9P02G-K06B-2020-R	DFN2020-6B	D	D	G	S	D	D	Tape Reel

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

UT9P02G-AG6-R 		(1) R: Tape Reel (2) AG6: SOT-26, K06B-2020: DFN2020-6B (3) G: Halogen Free and Lead Free, L: Lead Free
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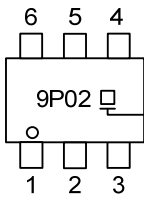
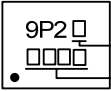


SOT-26



DFN2020-6B

■ MARKING

SOT-26	DFN2020-6
 Diagram of SOT-26 package marking. The package is a small rectangle with six pins. Pins 4, 5, and 6 are on the top edge, and pins 1, 2, and 3 are on the bottom edge. The marking '9P02' is in the center, followed by a small square. To the right of the package, an arrow points to the text 'L: Lead Free' and 'G: Halogen Free'.	 Diagram of DFN2020-6 package marking. The package is a small rectangle with six pins. The marking '9P2' is in the center, followed by a small square. Below this, there are three small squares, and below those, a small circle. To the right of the package, an arrow points to the text 'L: Lead Free', 'G: Halogen Free', and 'Date Code'.

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

PARAMETER		SYMBOL	RATINGS	UNIT
Drain-Source Voltage		V_{DS}	-20	V
Gate-Source Voltage		V_{GS}	± 8	V
Drain Current	Continuous	I_D	-9	A
	Pulsed (Note 2)	I_{DM}	-18	A
Avalanche Energy		E_{AS}	20	mJ
Power Dissipation	SOT-26	P_D	1.2	W
	DFN2020-6B		2	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. $L=0.1\text{mH}$, $I_{AS}=-20\text{A}$, $V_{DD}=-15\text{V}$, $R_G=25\ \Omega$, Starting $T_J = 25^{\circ}\text{C}$.

■ THERMAL DATA

PARAMETER		SYMBOL	RATINGS	UNIT
Junction to Ambient	SOT-26	θ_{JA}	104	$^{\circ}\text{C/W}$
	DFN2020-6B		62.5	$^{\circ}\text{C/W}$

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

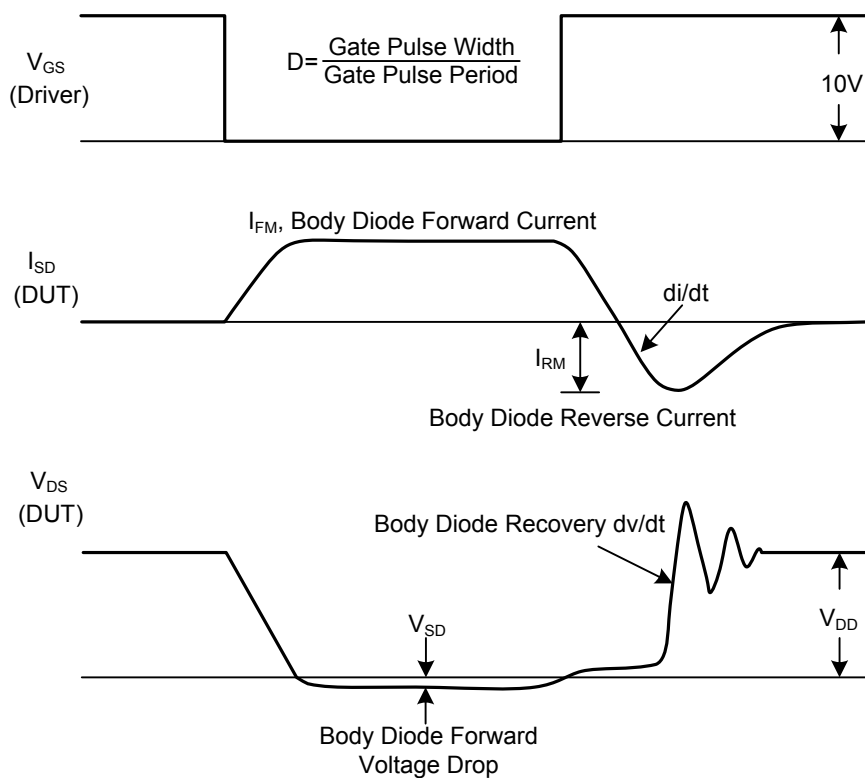
■ ELECTRICAL CHARACTERISTICS ($T_J=25^{\circ}\text{C}$, unless otherwise specified)

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
STATIC PARAMETERS						
Drain-Source Breakdown Voltage	BV _{DSS}	I _D =-250μA, V _{GS} =0V	-20			V
Zero Gate Voltage Drain Current	I _{DSS}	V _{DS} =-20V, V _{GS} =0V			-1	μA
Gate-Source Leakage Current	I _{GSS}	V _{GS} =±8V, V _{DS} =0V			±100	nA
ON CHARACTERISTICS						
Gate Threshold Voltage	V _{GS(TH)}	V _{DS} =V _{GS} , I _D =-250μA	-0.3		-1.0	V
Static Drain-Source On-State Resistance	R _{DS(ON)}	V _{GS} =-4.5V, I _D =-4.5A		19	23	mΩ
		V _{GS} =-2.5V, I _D =-4.5A		25	32	mΩ
		V _{GS} =-1.8V, I _D =-2.5A		35	45	mΩ
DYNAMIC PARAMETERS						
Input Capacitance	C _{ISS}	V _{GS} =0V, V _{DS} =-10V, f=1.0MHz		1500		pF
Output Capacitance	C _{OSS}			290		pF
Reverse Transfer Capacitance	C _{RSS}			250		pF
SWITCHING PARAMETERS						
Total Gate Charge	Q _G	V _{DS} =-16V, V _{GS} =-4.5V, I _D =-9.0A (Note 1, 2)		20		nC
Gate to Source Charge	Q _{GS}			2.4		nC
Gate to Drain Charge	Q _{GD}			7		nC
Turn-ON Delay Time	t _{D(ON)}	V _{DD} =-10V, V _{GS} =-10V, I _D =-9.0A, R _G =3.3Ω (Note 1, 2)		16		ns
Turn-ON Rise Time	t _R			24		ns
Turn-OFF Delay Time	t _{D(OFF)}			70		ns
Turn-OFF Fall-Time	t _F			22		ns
SOURCE- DRAIN DIODE RATINGS AND CHARACTERISTICS						
Maximum Body-Diode Continuous Current	I _S				-9	A
Maximum Body-Diode Pulsed Current	I _{SM}				-18	A
Diode Forward Voltage	V _{SD}	I _S =-1.0A, V _{GS} =0V			-1.2	V

Notes: 1. Pulse Test: Pulse width $\leq 300\mu\text{s}$, Duty cycle $\leq 2\%$.

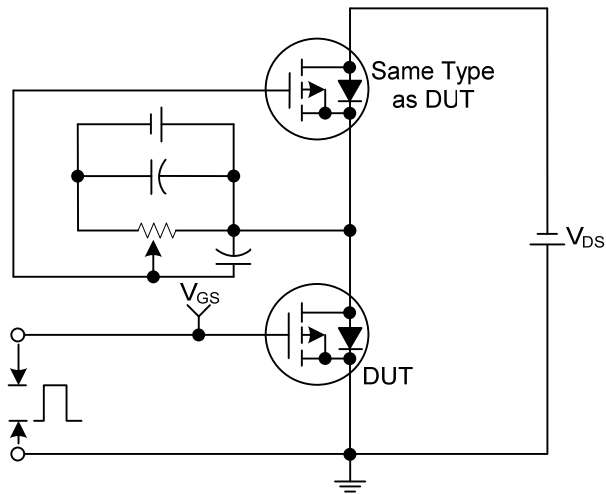
2. Essentially independent of operating temperature.

dv/dt controlled by R_G
 I_{SD} controlled by pulse period

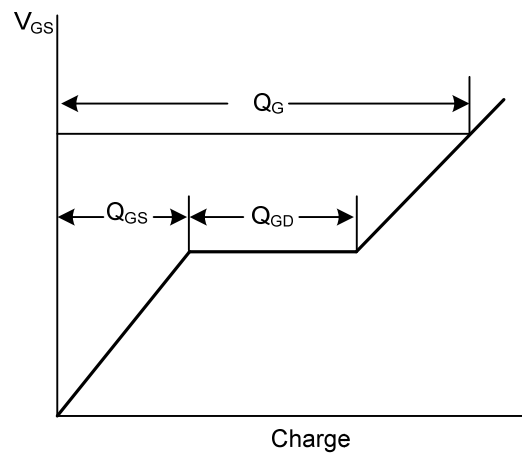


Peak Diode Recovery dv/dt Test Circuit and Waveforms

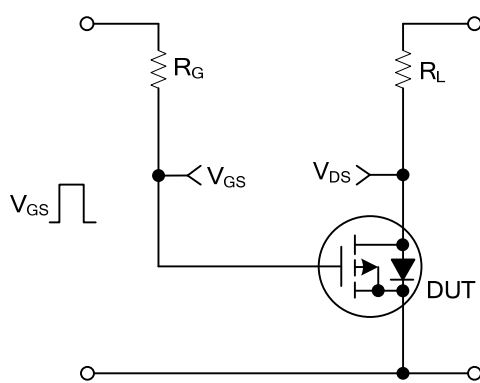
■ TEST CIRCUITS AND WAVEFORMS



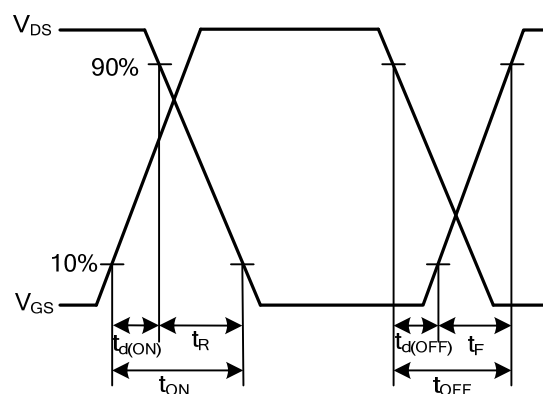
Gate Charge Test Circuit



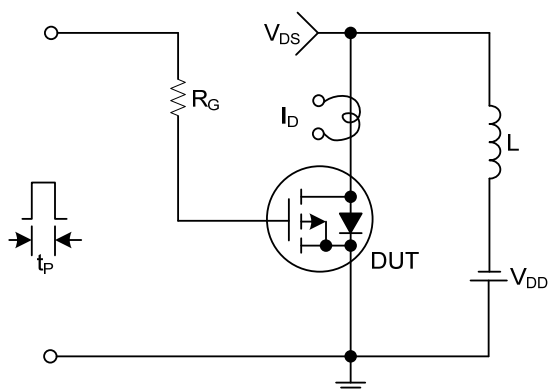
Gate Charge Waveforms



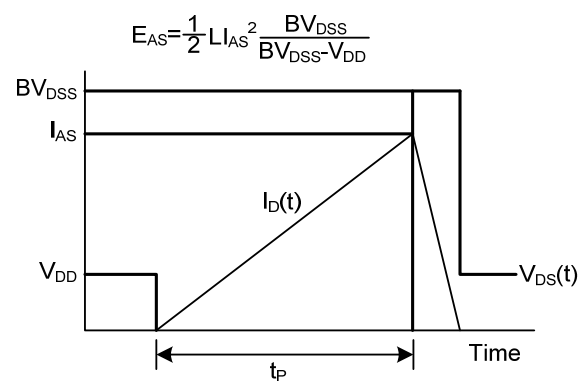
Resistive Switching Test Circuit



Resistive Switching Waveforms



Unclamped Inductive Switching Test Circuit



Unclamped Inductive Switching Waveforms

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