



## UT20N02L

Preliminary

Power MOSFET

## 20A, 20V N-CHANNEL POWER MOSFET

### DESCRIPTION

The UTC **UT20N02L** is a N-channel power MOSFET providing very low on-resistance. It has high efficiency and perfect cost-effectiveness. This device is ideal for load switch and battery protection applications. For example in applications such as switching regulators, switching converters, motor drivers and relay drivers.

These transistors can be operated directly from integrated circuits, applied in the commercial and industrial fields.

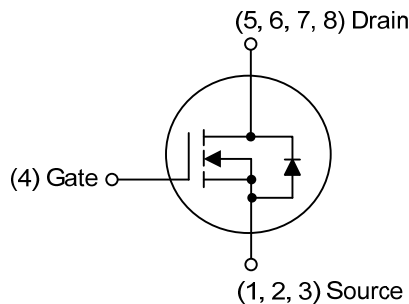
### FEATURES

\*  $R_{DS(on)} \leq 20 \text{ m}\Omega$  @  $V_{GS}=4.5\text{V}$ ,  $I_D=10\text{A}$

$R_{DS(on)} \leq 35 \text{ m}\Omega$  @  $V_{GS}=2.5\text{V}$ ,  $I_D=4.0\text{A}$

\* High breakdown voltage

### SYMBOL



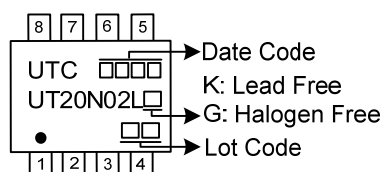
### ORDERING INFORMATION

Ordering Number		Package	Pin Assignment								Packing
Lead Free	Halogen Free		1	2	3	4	5	6	7	8	
UT20N02LK-S08-R	UT20N02LG-S08-R	SOP-8	S	S	S	G	D	D	D	D	Tape Reel

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

<b>UT20N02LG-S08-R</b> 		(1) R: Tape Reel (2) S08: SOP-8 (3) G: Halogen Free and Lead Free, K: Lead Free
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### MARKING



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

PARAMETER		SYMBOL	RATINGS	UNIT
Drain-Source Voltage		$V_{DSS}$	20	V
Gate-Source Voltage		$V_{GSS}$	$\pm 8$	V
Drain Current	Continuous	$I_D$	20	A
	Pulsed	$I_{DM}$	40	A
Single Pulsed Avalanche Energy (Note 3)		$E_{AS}$	17	mJ
Power Dissipation ( $T_C = 25^\circ\text{C}$ )		$P_D$	1	W
Junction Temperature		$T_J$	+150	$^\circ\text{C}$
Storage Temperature Range		$T_{STG}$	-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.  $L=0.1\text{mH}$ ,  $I_{AS}=18.4\text{A}$ ,  $V_{DD}=20\text{V}$ ,  $R_G=25\ \Omega$ , Starting  $T_J = 25^\circ\text{C}$

■ THERMAL DATA

PARAMETER	SYMBOL	RATINGS	UNIT
Junction to Ambient	$\theta_{JA}$	125	$^\circ\text{C/W}$
Junction to Case	$\theta_{JC}$	40 (Note)	$^\circ\text{C/W}$

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

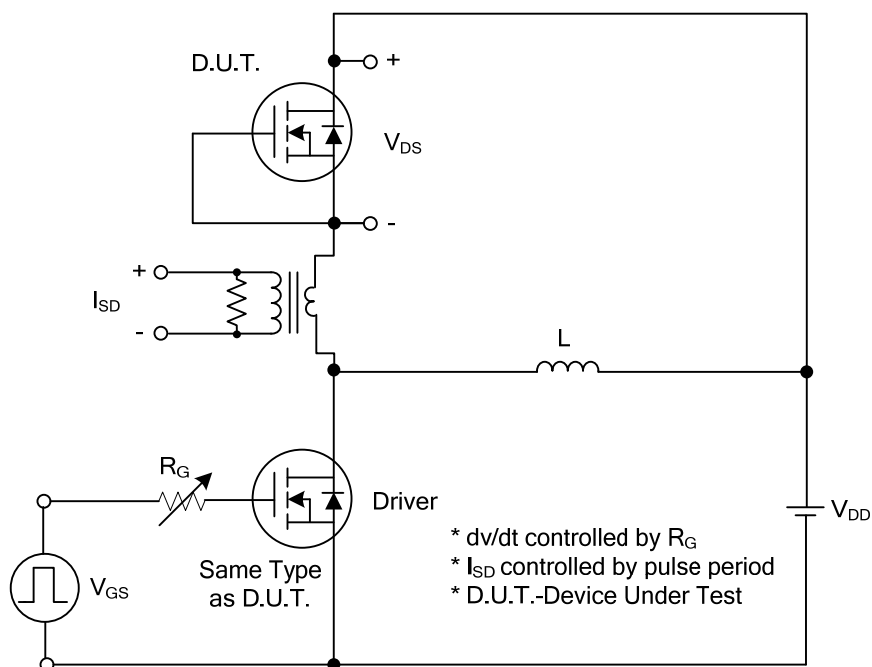
■ ELECTRICAL CHARACTERISTICS ( $T_J = 25^\circ\text{C}$ , unless otherwise specified)

PARAMETER		SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
OFF CHARACTERISTICS							
Drain-Source Breakdown Voltage		BV <sub>DSS</sub>	I <sub>D</sub> =250μA, V <sub>GS</sub> =0V	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>GS</sub> =+8V, V <sub>DS</sub> =0V			+100	nA
	Reverse		V <sub>GS</sub> =-8V, V <sub>DS</sub> =0V			-100	nA
ON CHARACTERISTICS							
Gate Threshold Voltage		V <sub>GS(TH)</sub>	V <sub>DS</sub> =V <sub>GS</sub> , I <sub>D</sub> =250μA	0.3		1.0	V
Static Drain-Source On-State Resistance		R <sub>DS(ON)</sub>	V <sub>GS</sub> =4.5V, I <sub>D</sub> =10A			20	mΩ
			V <sub>GS</sub> =2.5V, I <sub>D</sub> =4.0A			35	mΩ
DYNAMIC PARAMETERS							
Input Capacitance		C <sub>ISS</sub>	V <sub>GS</sub> =0V, V <sub>DS</sub> =10V, f=1.0MHz		1300		pF
Output Capacitance		C <sub>OSS</sub>			800		pF
Reverse Transfer Capacitance		C <sub>RSS</sub>			730		pF
SWITCHING PARAMETERS							
Total Gate Charge		Q <sub>G</sub>	V <sub>DS</sub> =10V, V <sub>GS</sub> =4.5V, I <sub>D</sub> =20A, I <sub>D</sub> =1mA (Note 1, 2)		14.8		nC
Gate to Source Charge		Q <sub>GS</sub>			2.8		nC
Gate to Drain Charge		Q <sub>GD</sub>			5		nC
Turn-ON Delay Time		t <sub>D(ON)</sub>	V <sub>DS</sub> =10V, V <sub>GS</sub> =4.5V, I <sub>D</sub> =20A, R <sub>G</sub> =25Ω (Note 1, 2)		8.8		ns
Rise Time		t <sub>R</sub>			28.4		ns
Turn-OFF Delay Time		t <sub>D(OFF)</sub>			80		ns
Fall-Time		t <sub>F</sub>			56.4		ns
SOURCE- DRAIN DIODE RATINGS AND CHARACTERISTICS							
Maximum Body-Diode Continuous Current		I <sub>S</sub>				20	A
Maximum Body-Diode Pulsed Current		I <sub>SM</sub>				40	A
Drain-Source Diode Forward Voltage		V <sub>SD</sub>	I <sub>S</sub> =20A, V <sub>GS</sub> =0V			1.3	V
Reverse Recovery Time (Note 1)		t <sub>rr</sub>	I <sub>S</sub> =20A, V <sub>GS</sub> =0V		900		ns
Reverse Recovery Charge		Q <sub>rr</sub>	dI <sub>F</sub> /dt=100A/μs (Note1)		11.2		μC

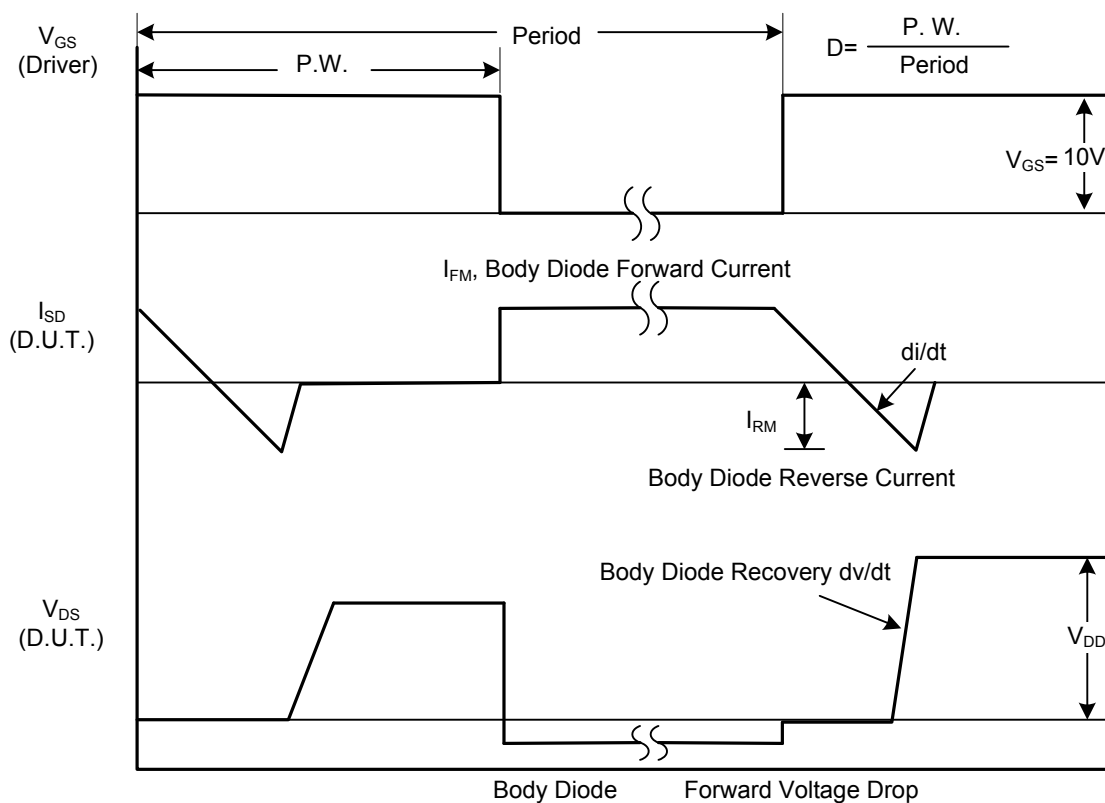
Notes: 1. Pulse Test: Pulse width  $\leq 300\mu\text{s}$ , Duty cycle  $\leq 2\%$ .

2. Essentially independent of operating temperature.

### ■ TEST CIRCUITS AND WAVEFORMS

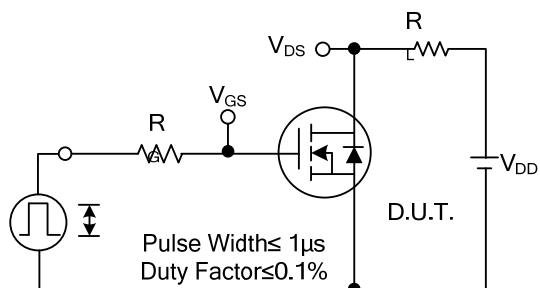


**Peak Diode Recovery  $dv/dt$  Test Circuit**

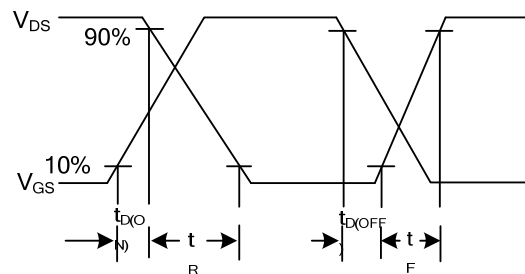


**Peak Diode Recovery  $dv/dt$  Waveforms**

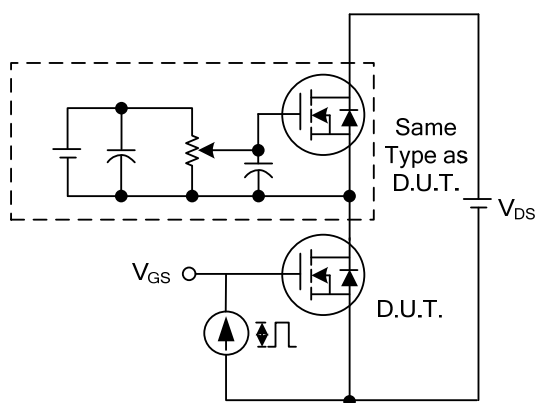
### ■ TEST CIRCUITS AND WAVEFORMS



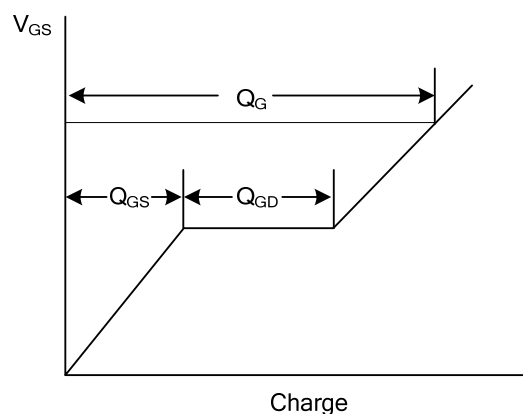
Switching Test Circuit



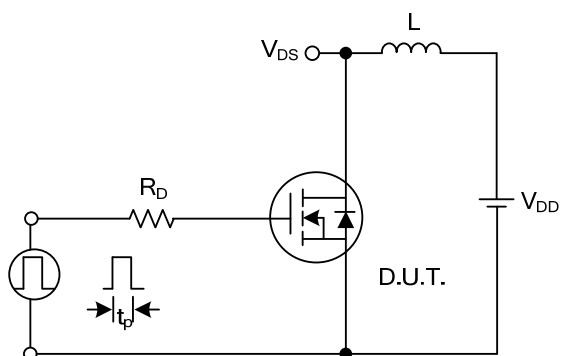
Switching Waveforms



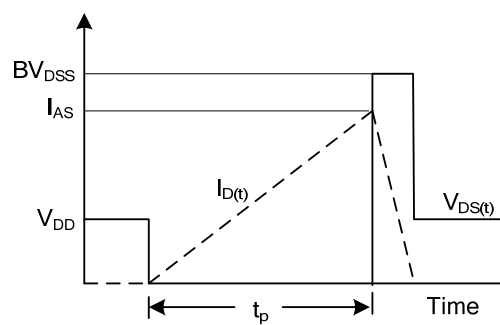
Gate Charge Test Circuit



Gate Charge Waveform



Unclamped Inductive Switching Test Circuit



Unclamped Inductive Switching Waveforms

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