



UT60P02L

Preliminary

POWER MOSFET

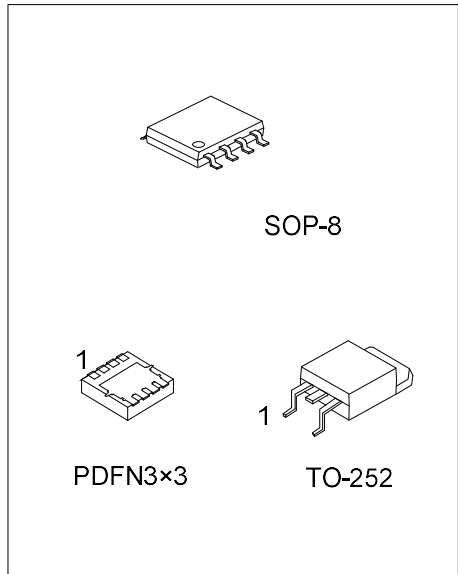
-60A, -20V P-CHANNEL POWER MOSFET

DESCRIPTION

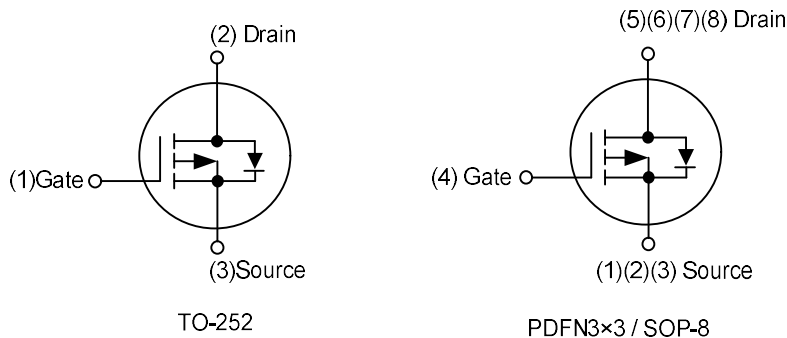
The UTC **UT60P02L** is the high cell density trench P-ch MOSFETs, which provide excellent RDSON and gate charge for most of the synchronous buck converter applications.

FEATURES

- * $R_{DS(ON)} \leq 12 \text{ m}\Omega$ @ $V_{GS} = -4.5\text{V}$, $I_D = -15\text{A}$
- * $R_{DS(ON)} \leq 15 \text{ m}\Omega$ @ $V_{GS} = -2.5\text{V}$, $I_D = -12\text{A}$
- * 100% EAS Guaranteed
- * Super Low Gate Charge
- * Excellent dv/dt effect decline
- * Advanced high cell density Trench technology
- * Green Product



SYMBOL



ORDERING INFORMATION

Ordering Number	Package	Pin Assignment								Packing
		1	2	3	4	5	6	7	8	
UT60P02LG-TN3-R	TO-252	G	D	S	-	-	-	-	-	Tape Reel
UT60P02LG-S08-R	SOP-8	S	S	S	G	D	D	D	D	Tape Reel
UT60P02LG-P3030-R	PDFN3x3	S	S	S	G	D	D	D	D	Tape Reel

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

UT60P02LG-TN3-R	(1) Packing Type	(1) R: Tape Reel
	(2) Package Type	(2) TN3: TO-252, S08: SOP-8, P3030: PDFN3x3
	(3) Green Package	(3) G: Halogen Free and Lead Free

MARKING

PACKAGE	MARKING
TO-252	UTC UT60P02LG □□□□□□ Lot Code ← → Date Code 1
SOP-8	8 7 6 5 UTC □□□□ UT60P02LG □□ • □□ → Date Code → Lot Code 1 2 3 4
PDFN3×3	UT 60P02L • □□□ → Date Code

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

PARAMETER			SYMBOL	RATINGS	UNIT
Drain-Source Voltage			V _{DSS}	-20	V
Gate-Source Voltage			V _{GSS}	±8	V
Drain Current	DC	SOP-8	I _D	-14	A
		TO-252		-60	A
		PDFN3×3		-50	A
	Pulsed (Note 2)	SOP-8	I _{DM}	-56	A
		TO-252		-120	A
		PDFN3×3		-100	A
Avalanche Energy	Single Pulsed (Note 3)		E _{AS}	84	mJ
Peak Diode Recovery dv/dt (Note 4)			dv/dt	1.13	V/ns
Power Dissipation	SOP-8		P _D	2.2	W
	TO-252			56	W
	PDFN3×3			33	W
Junction Temperature			T _J	+150	°C
Storage Temperature Range			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

3. $L = 0.1\text{mH}$, $I_{AS} = -41\text{A}$, $V_{DD} = -20\text{V}$, $R_G = 25\Omega$, Starting $T_J = 25^\circ\text{C}$

4. $I_{SD} \leq -30\text{A}$, $di/dt \leq 200\mu\text{A/s}$, $V_{DD} \leq BV_{DSS}$, Starting $T_J = 25^\circ\text{C}$

■ **THERMAL DATA**

PARAMETER		SYMBOL	RATINGS	UNIT
Junction to Ambient	SOP-8	θ_{JA}	125	$^\circ\text{C/W}$
	TO-252		62.5	$^\circ\text{C/W}$
	PDFN3×3		75	$^\circ\text{C/W}$
Junction to Case	SOP-8	θ_{JC}	56	$^\circ\text{C/W}$
	TO-252		2.23	$^\circ\text{C/W}$
	PDFN3×3		3.78 (Note)	$^\circ\text{C/W}$

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

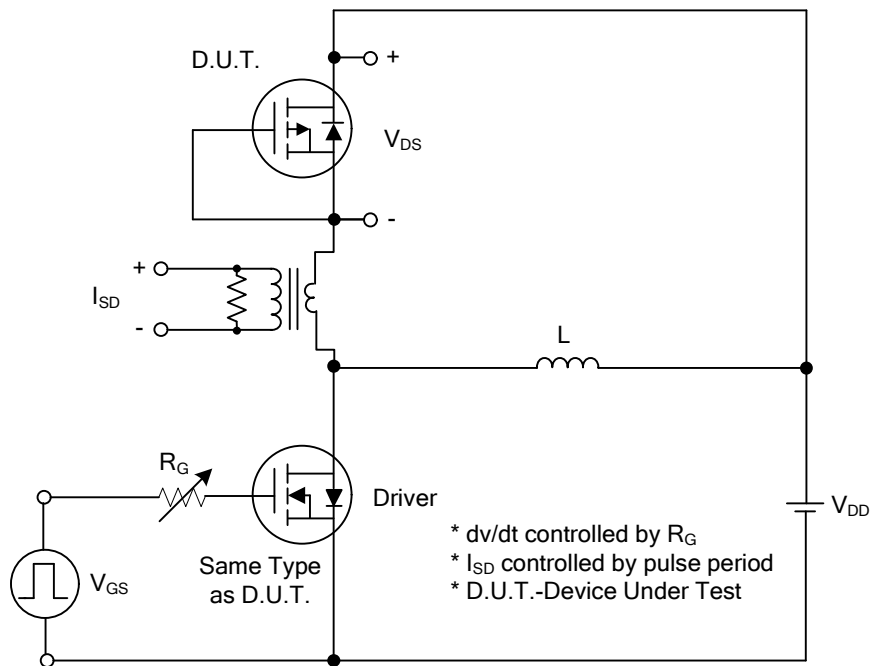
■ **ELECTRICAL CHARACTERISTICS** ($T_J = 25^\circ\text{C}$, unless otherwise specified)

PARAMETER		SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
OFF CHARACTERISTICS							
Drain-Source Breakdown Voltage		BV _{DSS}	V _{GS} =0V, 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 _{GS} =+8V, V _{DS} =0V			+100	nA
	Reverse		V _{GS} =-8V, V _{DS} =0V			-100	nA
ON CHARACTERISTICS							
Gate Threshold Voltage		V _{GS(TH)}	V _{DS} = V _{GS} , I _D =-250Ma	-0.3		-1.2	V
Static Drain-Source On-State Resistance		R _{DS(ON)}	V _{GS} =-4.5V, I _D =-15A			12	mΩ
			V _{GS} =-2.5V, I _D =-12A			15	mΩ
DYNAMIC PARAMETERS							
Input Capacitance		C _{ISS}	V _{GS} =0V, V _{DS} =-10V, f=1.0MHz		5884		pF
Output Capacitance		C _{OSS}			1091		pF
Reverse Transfer Capacitance		C _{RSS}			911		pF
SWITCHING PARAMETERS							
Total Gate Charge		Q _G	V _{DS} =-20V, V _{GS} =-4.5V, I _D =-60A (Note 1, 2)		119		nC
Gate to Source Charge		Q _{GS}			9		nC
Gate to Drain Charge		Q _{GD}			23		nC
Turn-ON Delay Time		t _{D(ON)}	V _{DS} =-10V, V _{GS} =-8V, I _D =-60A, R _G =2.7Ω (Note 1, 2)		18		ns
Rise Time		t _R			55		ns
Turn-OFF Delay Time		t _{D(OFF)}			912		ns
Fall-Time		t _F			404		ns
SOURCE-DRAIN DIODE RATINGS AND CHARACTERISTICS							
Maximum Continuous Drain-Source Diode Forward Current		I _S				-60	A
Maximum Pulsed Drain-Source Diode Forward Current		I _{SM}				-120	A
Diode Forward Voltage		V _{SD}	I _S =-20A, V _{GS} =0V			-1.2	V

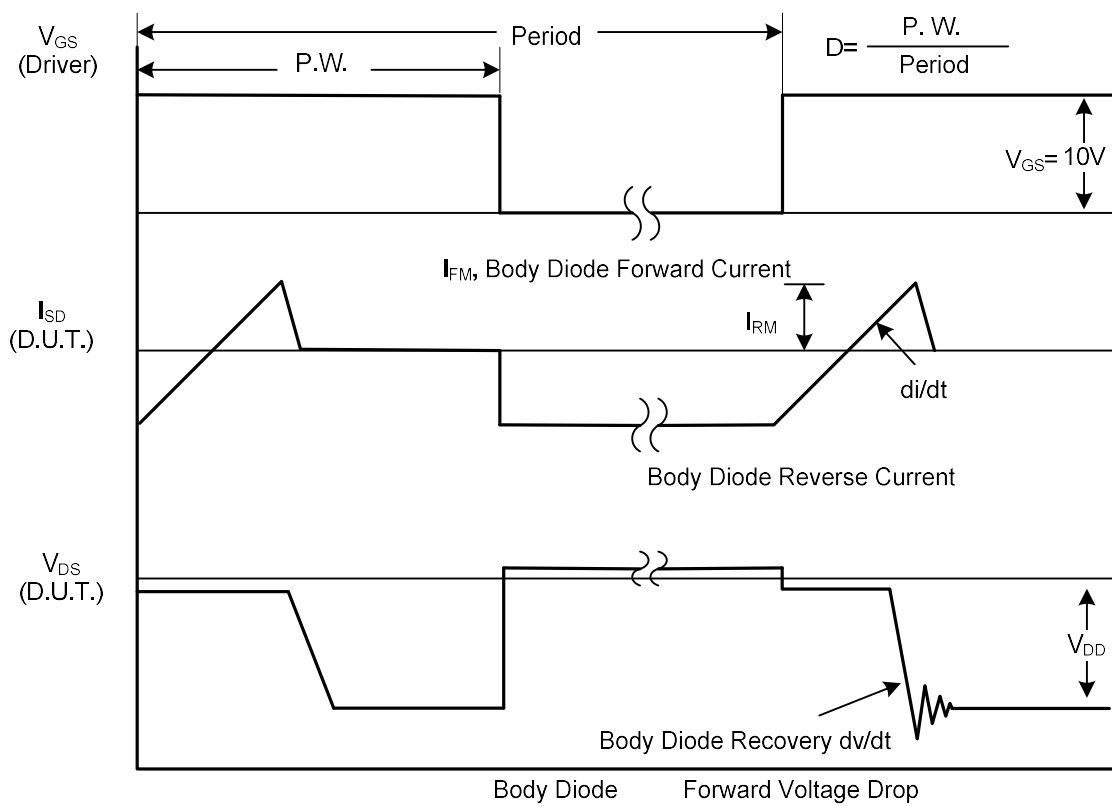
Notes: 1. Pulse Test: Pulse width $\leq 300\mu s$, Duty cycle $\leq 2\%$.

2. Essentially independent of operating temperature.

■ TEST CIRCUITS AND WAVEFORMS

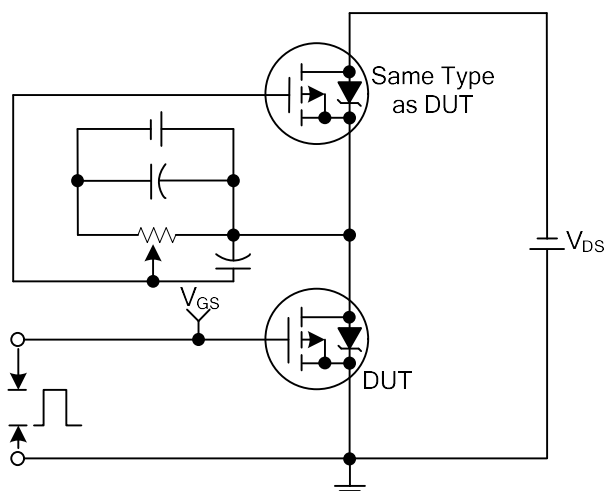


Peak Diode Recovery dv/dt Test Circuit

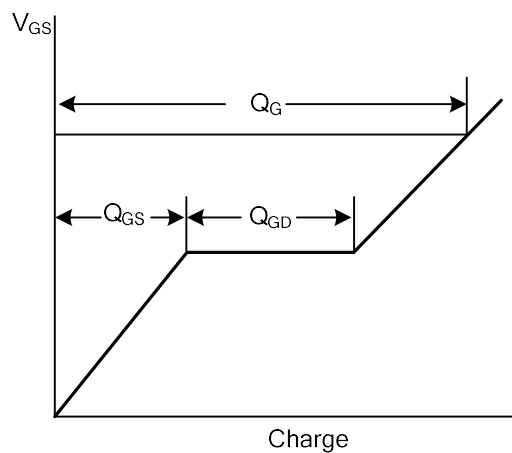


Peak Diode Recovery dv/dt Waveforms

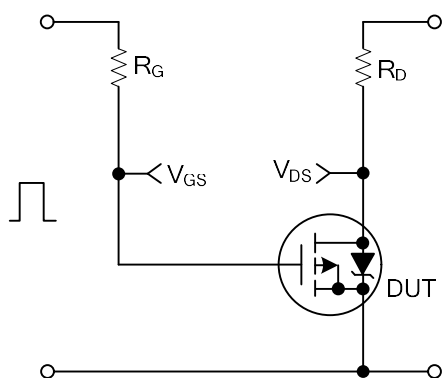
■ TEST CIRCUITS AND WAVEFORMS



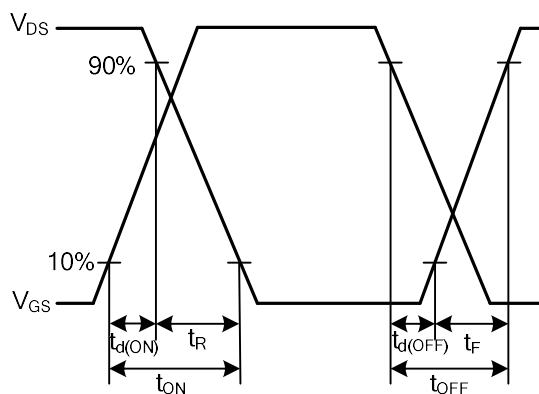
Gate Charge Test Circuit



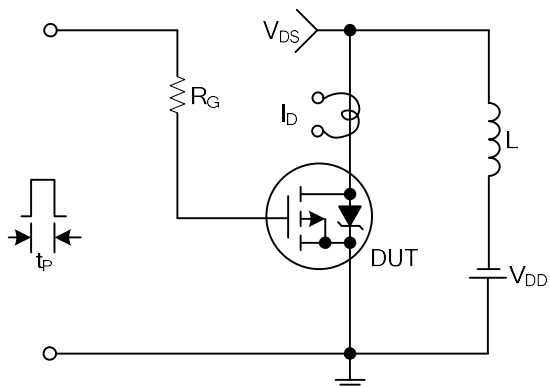
Gate Charge Waveforms



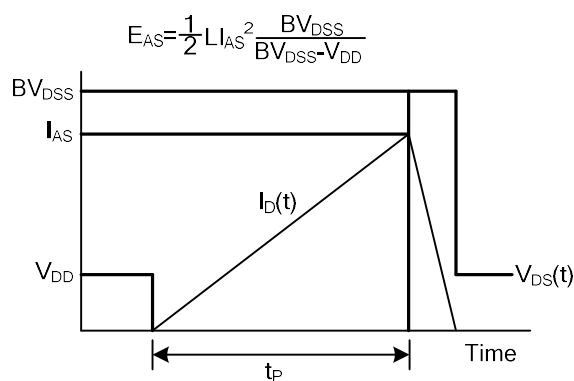
Resistive Switching Test Circuit



Resistive Switching Waveforms



Unclamped Inductive Switching Test Circuit



Unclamped Inductive Switching Waveforms

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