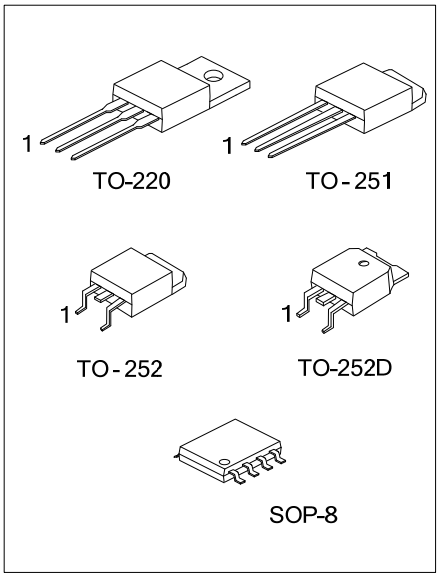
UTT40P04

Power MOSFET

-50A, -40V P-CHANNEL POWER MOSFET



■ DESCRIPTION

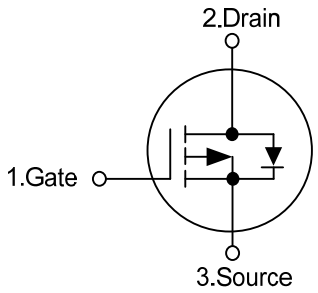
The UTC **UTT40P04** is a P-channel power MOSFET using UTC's advanced technology to provide the customers with high switching speed and a minimum on-state resistance. It can also withstand high energy in the avalanche.

This UTC **UTT40P04** is suitable for Inverter or Power supplies.

■ FEATURES

* $R_{DS(ON)}$ < 20mΩ @ V_{GS}=-10V, I_D=-12.7A,
  $R_{DS(ON)}$ < 30 mΩ @ V_{GS}=-4.5V, I_D=-10.4A

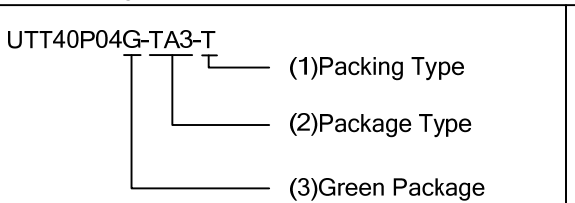
■ SYMBOL



■ ORDERING INFORMATION

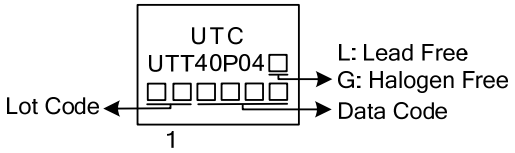
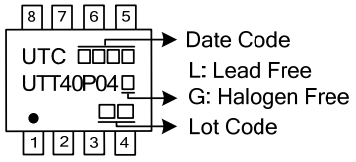
Ordering Number		Package	Pin Assignment								Packing
Lead Free	Halogen Free		1	2	3	4	5	6	7	8	
UTT40P04L-TA3-T	UTT40P04G-TA3-T	TO-220	G	D	S	-	-	-	-	-	Tube
UTT40P04L-TM3-T	UTT40P04G-TM3-T	TO-251	G	D	S	-	-	-	-	-	Tube
UTT40P04L-TN3-R	UTT40P04G-TN3-R	TO-252	G	D	S	-	-	-	-	-	Tape Reel
UTT40P04L-TND-R	UTT40P04G-TND-R	TO-252D	G	D	S	-	-	-	-	-	Tape Reel
UTT40P04L-S08-R	UTT40P04G-S08-R	SOP-8	S	S	S	G	D	D	D	D	Tape Reel

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



(1) T: Tube, R: Tape Reel
(2) TA3: TO-220, TM3: TO-251, TN3: TO-252, TND: TO-252D, S08: SOP-8
(3) G: Halogen Free and Lead Free, L: Lead Free

■ MARKING

TO-220 / TO-251 / TO-252 / TO-252D	SOP-8
	

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

PARAMETER			SYMBOL	RATINGS	UNIT
Drain-Source Voltage			V_{DSS}	-40	V
Gate-Source Voltage			V_{GSS}	±20	V
Drain Current	Continuous	Package limited	I_D	-50	A
		Silicon limited		-58	A
	Pulsed		I_{DM}	-100	A
Single Pulsed Avalanche Energy (Note 2)			E_{AS}	337	mJ
Power Dissipation	T_C=25°C	TO-220	P_D	125	W
		TO-251/TO-252 TO-252D		55	W
		SOP-8		3.4	W
	T_A=25°C	TO-220		2	W
		TO-251/TO-252 TO-252D		1.1	W
		SOP-8		1.6	W
Junction Temperature			T_J	-55 ~ +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. Starting T_J = 25°C, L = 3mH, I_{AS} = 15A, V_{DD} = 40V, V_{GS} = 10V.

■ THERMAL DATA

PARAMETER		SYMBOL	RATINGS	UNIT
Junction to Ambient	TO-220	θ_{JA}	62.5	°C/W
	TO-251/TO-252 TO-252D		110	°C/W
	SOP-8		75 (Note)	°C/W
Junction to Case	TO-220	θ_{JC}	1	°C/W
	TO-251/TO-252 TO-252D		2.27	°C/W
	SOP-8		36.7	°C/W

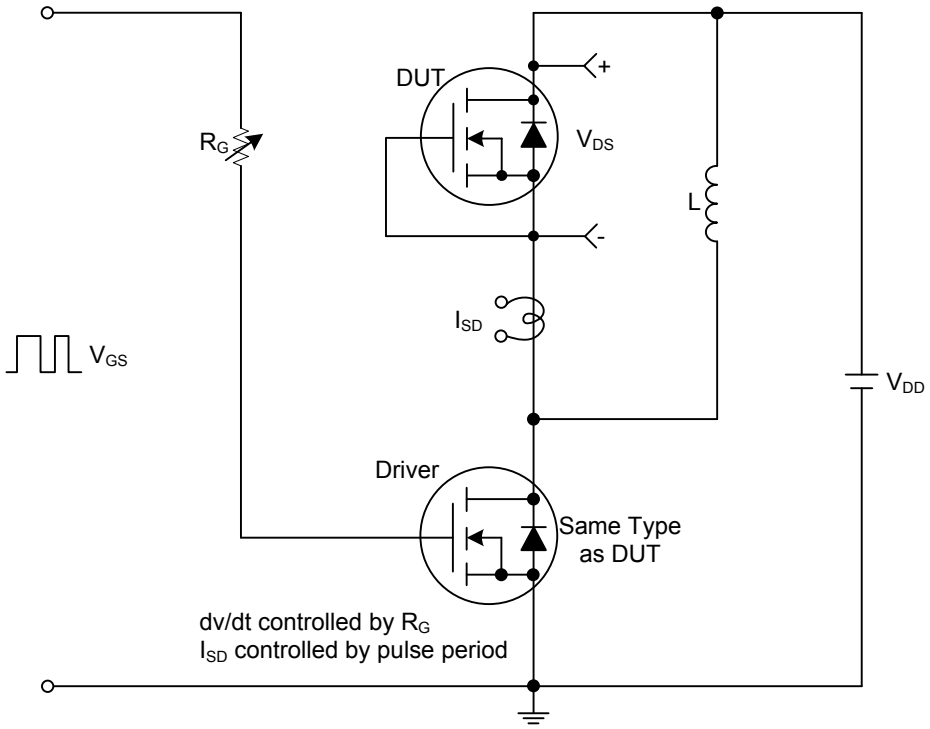
Note: The value of $R_{\theta JA}$ is measured with the device mounted on 1in^2 FR-4 board with 2oz. Copper, in a still air environment with T_A =25°C. The value in any given application depends on the user's specific board design. The current rating is based on the t ≤ 10s thermal resistance rating.

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

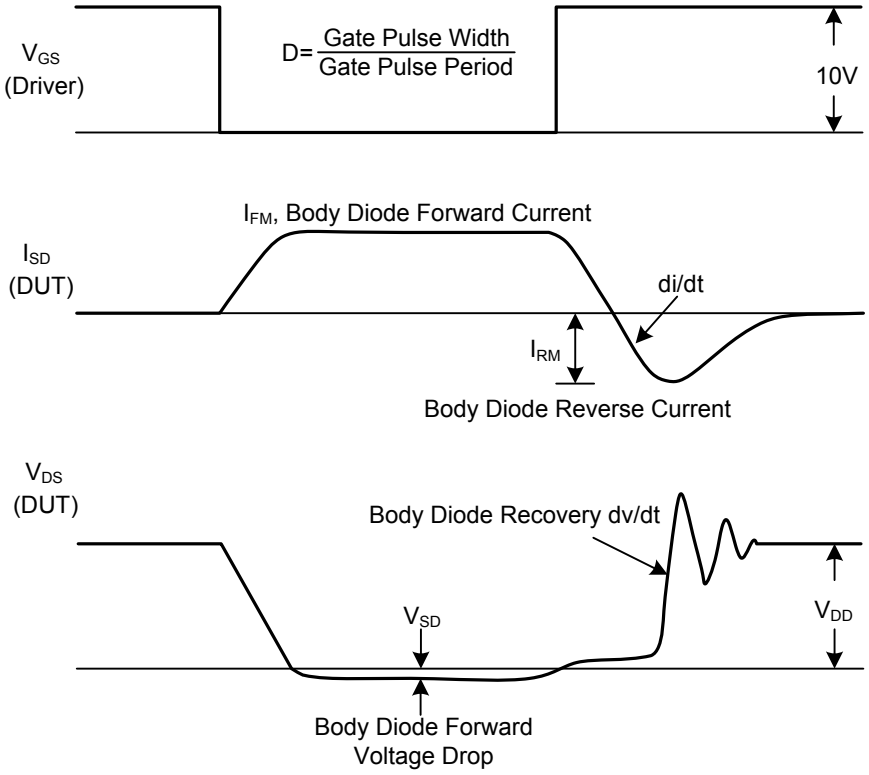
PARAMETER		SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
OFF CHARACTERISTICS							
Drain-Source Breakdown Voltage		BV_{DSS}	I_D=-250μA, V_{GS}=0V	-40			V
Drain-Source Leakage Current		I_{DSS}	V_{DS}=-32V, V_{GS}=0V			-1	μA
Gate- Source Leakage Current	Forward	I_{GSS}	V_{GS}=+20V, V_{DS}=0V			+100	nA
	Reverse		V_{GS}=-20V, V_{DS}=0V			-100	nA
ON CHARACTERISTICS							
Gate Threshold Voltage		$V_{GS(TH)}$	V_{DS}=V_{GS}, I_D=-250μA	-1	-1.8	-3	V
Static Drain-Source On-State Resistance		$R_{DS(ON)}$	V_{GS}=-10V, I_D=-12.7A		17	20	mΩ
			V_{GS}=-4.5V, I_D=-10.4A		24	30	mΩ
DYNAMIC PARAMETERS							
Input Capacitance		C_{ISS}	V_{GS}=0V, V_{DS}=-20V, f=1.0MHz		2085	2775	pF
Output Capacitance		C_{OSS}			360	480	pF
Reverse Transfer Capacitance		C_{RSS}			210	310	pF
Gate Resistance		R_G	f=1.0MHz		4.6		Ω
SWITCHING PARAMETERS							
Total Gate Charge		Q_G	V_{GS}=0~-10V, V_{DD}=-20V, I_D=-12.7A		230		nC
			V_{GS}=0~-5V, V_{DD}=-20V, I_D=-12.7A		120		nC
Gate to Source Charge		Q_{GS}	V_{DD}=-20V, I_D=-12.7A		17		nC
Gate to Drain Charge		Q_{GD}			21		nC
Turn-ON Delay Time		$t_{D(ON)}$	V_{DD}=-20V, I_D=-12.7A, R_{GEN}=6Ω, V_{GS}=-10V		36		ns
Rise Time		t_R			76		ns
Turn-OFF Delay Time		$t_{D(OFF)}$			600		ns
Fall-Time		t_F			380		ns
SOURCE- DRAIN DIODE RATINGS AND CHARACTERISTICS							
Drain-Source Diode Forward Voltage		V_{SD}	I_S=-12.7A, V_{GS}=0V (Note 1)		-0.8	-1.2	V
Body Diode Reverse Recovery Time		t_{rr}	I_F=-12.7A, di/dt=100A/μs		29	44	ns
Body Diode Reverse Recovery Charge		Q_{rr}			26	40	μC

Notes: 1. Pulse Test: Pulse Width < 300μs, Duty cycle < 2.0%.
2. Starting T_J = 25°C, L = 3mH, I_{AS} = 15A, V_{DD} = 40V, V_{GS} = 10V.

■ TEST CIRCUITS AND WAVEFORMS



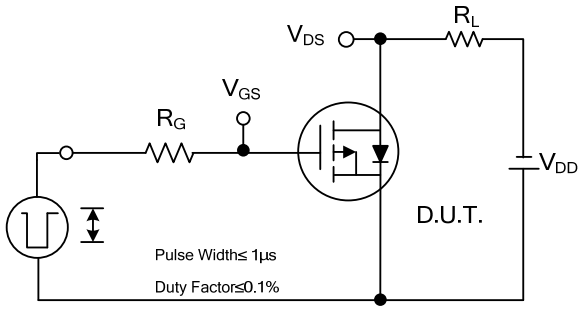
Peak Diode Recovery dv/dt Test Circuit



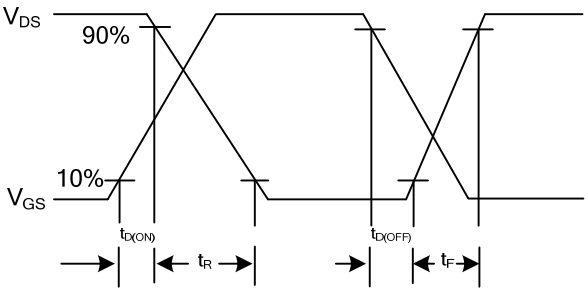
Peak Diode Recovery dv/dt Test Circuit and Waveforms

Peak Diode Recovery dv/dt Waveforms

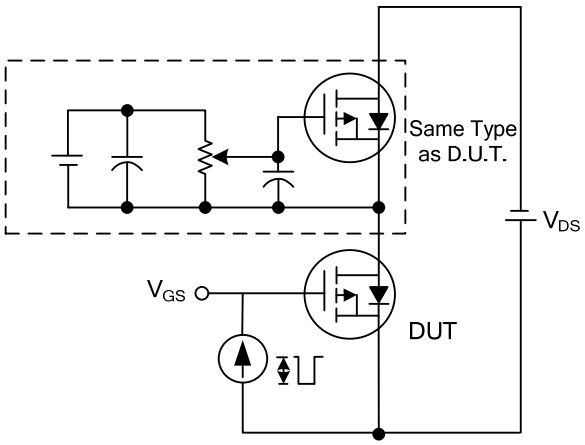
■ TEST CIRCUITS AND WAVEFORMS



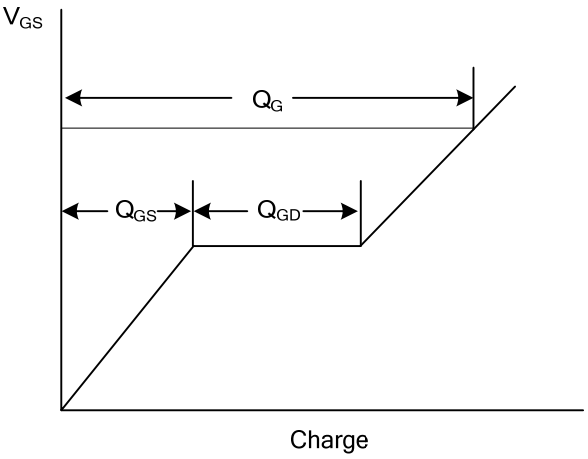
Switching Test Circuit



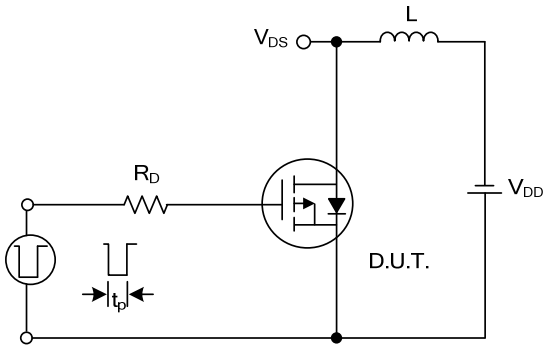
Switching Waveforms



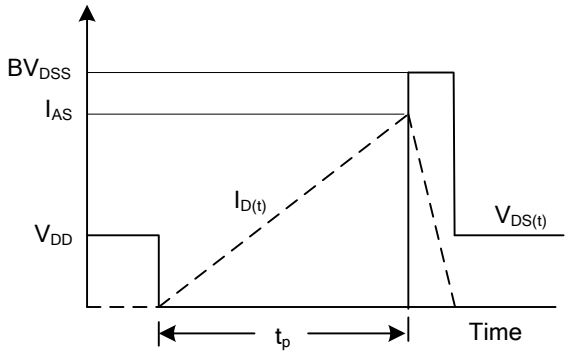
Gate Charge Test Circuit



Gate Charge Waveform

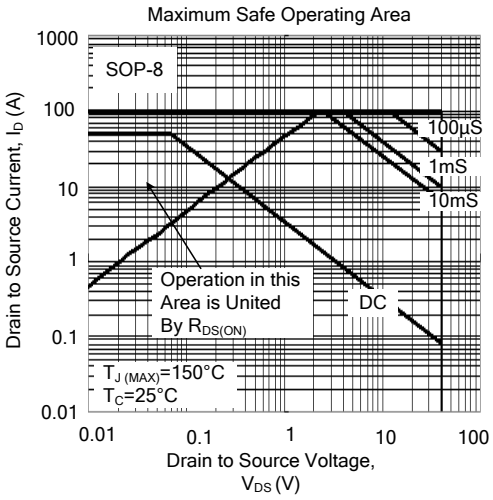


Unclamped Inductive Switching Test Circuit



Unclamped Inductive Switching Waveforms

■ TYPICAL CHARACTERISTICS



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