

**UT70P04**

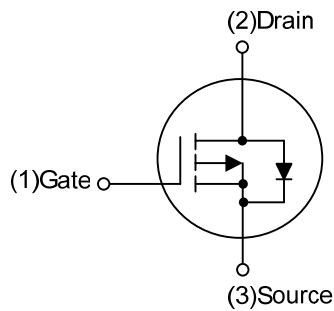
Preliminary

Power MOSFET**-70A, -40V P-CHANNEL
POWER MOSFET****DESCRIPTION**

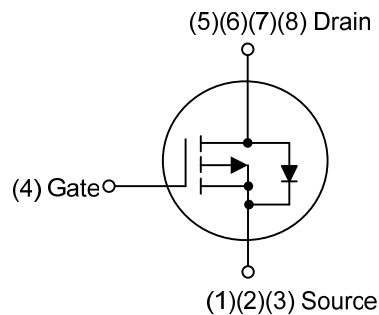
The UTC **UT70P04** is a P-channel power MOSFET using UTC's advanced technology to provide the customers with high switching speed, cost-effectiveness and a minimum on-state resistance. It can also withstand high energy in the avalanche.

FEATURES

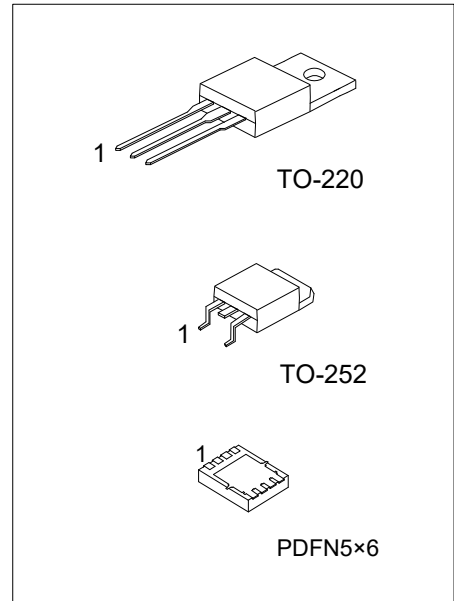
- * $R_{DS(ON)} \leq 11\text{ m}\Omega$ @ $V_{GS} = -10\text{V}$, $I_D = -35\text{A}$
- * $R_{DS(ON)} \leq 19\text{ m}\Omega$ @ $V_{GS} = -4.5\text{V}$, $I_D = -35\text{A}$
- * High Switching Speed

SYMBOL

TO-220 / TO-252



PDFN5x6

**ORDERING INFORMATION**

Ordering Number		Package	Pin Assignment								Packing
Lead Free	Halogen Free		1	2	3	4	5	6	7	8	
UT70P04L-TA3-T	UT70P04G-TA3-T	TO-220	G	D	S	-	-	-	-	-	Tube
UT70P04L-TN3-R	UT70P04G-TN3-R	TO-252	G	D	S	-	-	-	-	-	Tape Reel
UT70P04L-P5060-R	UT70P04G-P5060-R	PDFN5x6	S	S	S	G	D	D	D	D	Tape Reel

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

UT70P04G-TA3-T		(1) Packing Type	(1) T: Tube, R: Tape Reel
		(2) Package Type	(2) TA3: TO-220, TN3: TO-252, P5060: PDFN5x6
		(3) Green Package	(3) G: Halogen Free and Lead Free, L: Lead Free

■ MARKING

TO-220 / TO-252	PDFN5x6
UTC UT70P04 Lot Code ← [] [] [] [] [] → Date Code 1 L: Lead Free G: Halogen Free	UTC UT 70P04 Lot Code ← [] [] [] [] [] [] → Date Code

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

PARAMETER			SYMBOL	RATINGS	UNIT
Drain-Source Voltage			V _{DSS}	-40	V
Gate-Source Voltage			V _{GSS}	±20	V
Drain Current	Continuous	T _C =25°C	I _D	-70	A
		T _C =100°C		-42	A
	Pulsed (Note 2)		I _{DM}	-140	A
Avalanche Energy	Repetitive (Note 3)		E _{AS}	102	mJ
Peak Diode Recovery dv/dt (Note 4)			dv/dt	0.7	V/ns
Power Dissipation (T _C =25°C)		TO-220	P _D	90	W
		TO-252		49	W
		PDFN5×6		42	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. Repetitive Rating: Pulse width limited by maximum junction temperature.

3. $L = 0.1\text{mH}$, $I_{\text{AS}} = -31\text{A}$, $V_{\text{DD}} = -50\text{V}$, $R_{\text{G}} = 25\Omega$, Starting $T_{\text{J}} = 25^{\circ}\text{C}$

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

■ **THERMAL DATA**

PARAMETER		SYMBOL	RATINGS	UNIT
Junction to Ambient	TO-220	θ_{JA}	62.5	$^{\circ}\text{C}/\text{W}$
	TO-252		110	$^{\circ}\text{C}/\text{W}$
	PDFN5×6		65 (Note)	$^{\circ}\text{C}/\text{W}$
Junction to Case	TO-220	θ_{JC}	1.38	$^{\circ}\text{C}/\text{W}$
	TO-252		2.77 (Note)	$^{\circ}\text{C}/\text{W}$
	PDFN5×6		2.97 (Note)	$^{\circ}\text{C}/\text{W}$

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

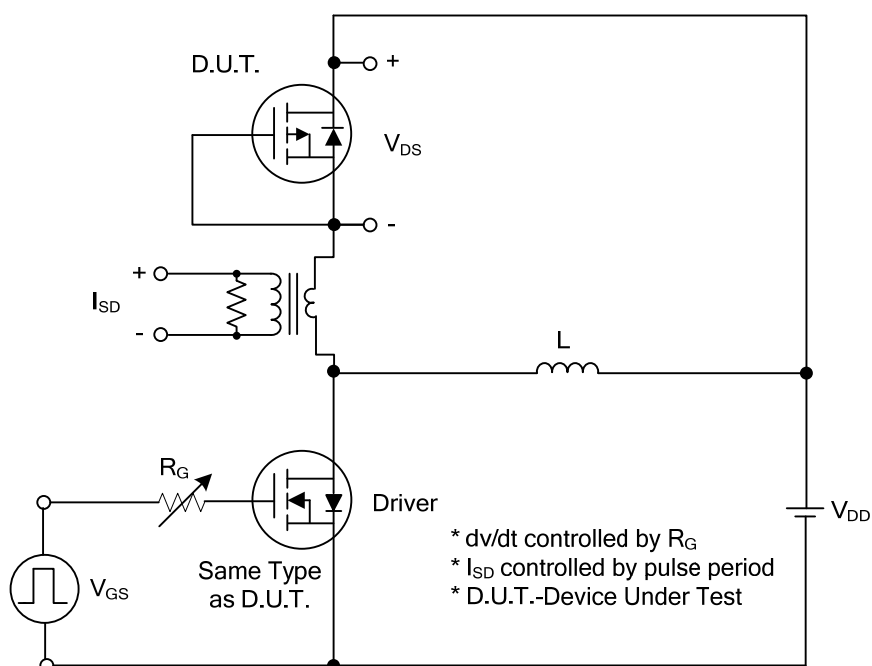
■ **ELECTRICAL CHARACTERISTICS** ($T_J=25^\circ\text{C}$, unless otherwise specified)

PARAMETER		SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
OFF CHARACTERISTICS							
Drain-Source Breakdown Voltage		BV _{DSS}	I _D =-250μA, V _{GS} =0V	-40			V
Drain-Source Leakage Current		I _{DSS}	V _{DS} =-40V, 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	-1.0		-3.0	V
Static Drain-Source On-State Resistance		R _{DS(ON)}	V _{GS} =-10V, I _D =-35A			11	mΩ
			V _{GS} =-4.5V, I _D =-35A			19	mΩ
DYNAMIC PARAMETERS							
Input Capacitance		C _{ISS}	V _{DS} =-25V, V _{GS} =0V, f=1.0MHz		4880		pF
Output Capacitance		C _{OSS}			581		pF
Reverse Transfer Capacitance		C _{RSS}			436		pF
SWITCHING PARAMETERS							
Total Gate Charge		Q _G	V _{DS} =-32V, V _{GS} =-10V, I _D =-70A (Note 1, 2)		97		nC
Gate to Source Charge		Q _{GS}			24		nC
Gate to Drain ("Miller") Charge		Q _{GD}			17		nC
Turn-ON Delay Time		t _{D(ON)}	V _{DS} =-20V, V _{GS} =-10V, I _D =-70A, R _G =3Ω (Note 1, 2)		23		ns
Rise Time		t _R			27		ns
Turn-OFF Delay Time		t _{D(OFF)}			73		ns
Fall-Time		t _F			49		ns
SOURCE- DRAIN DIODE RATINGS AND CHARACTERISTICS							
Maximum Body-Diode Continuous Current (Note 1)		I _S				-70	A
Maximum Body-Diode Pulsed Current		I _{SM}				-140	A
Drain-Source Diode Forward Voltage		V _{SD}	I _S =-70A, V _{GS} =0V			-1.4	V
Body Diode Reverse Recovery Time (Note 1)		t _{rr}	I _S =-70A, V _{GS} =0V,		86		ns
Body Diode Reverse Recovery Charge		Q _{rr}	dI _F /dt=100A/μs		172		nC

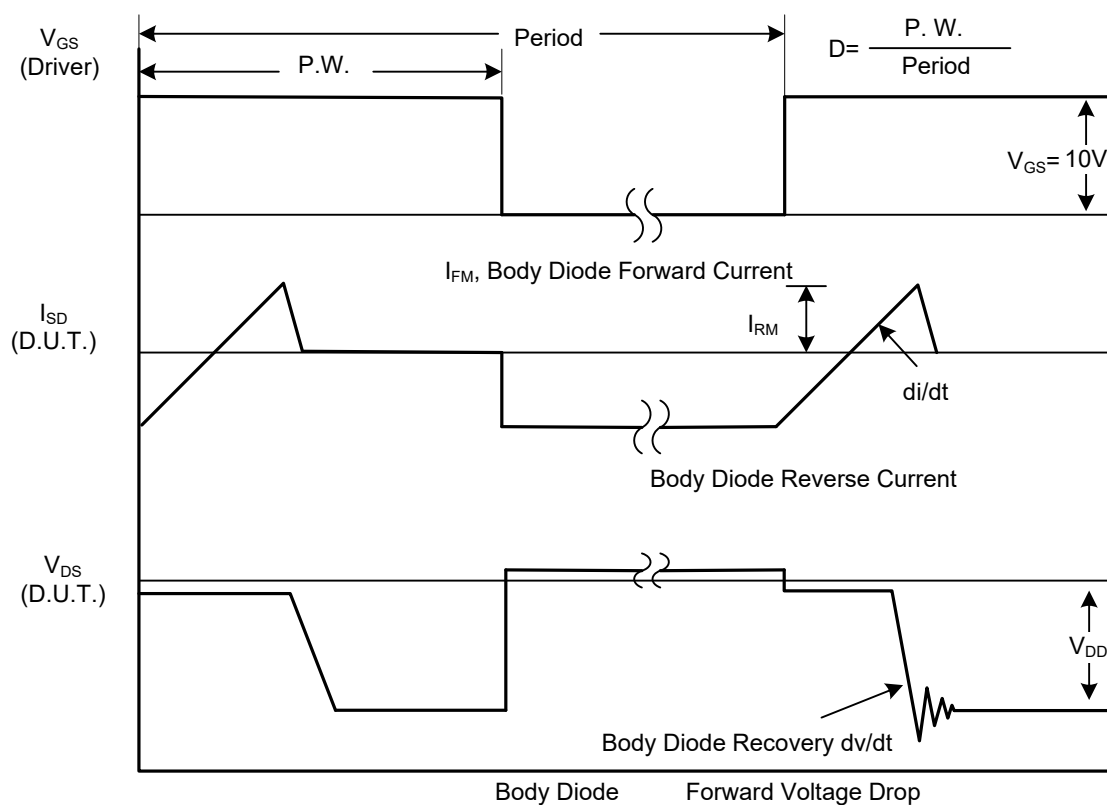
Notes: 1. Pulse Test: Pulse width $\leq 300\mu\text{s}$, Duty cycle $\leq 2\%$.

2. Essentially independent of operating ambient temperature.

■ TEST CIRCUITS AND WAVEFORMS

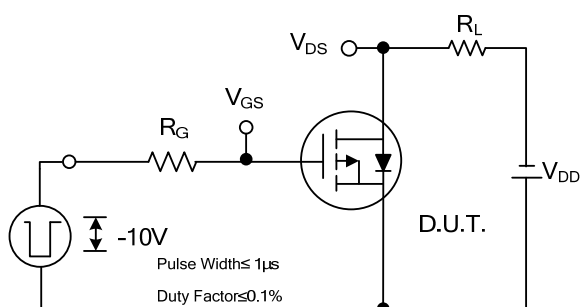


Peak Diode Recovery dv/dt Test Circuit

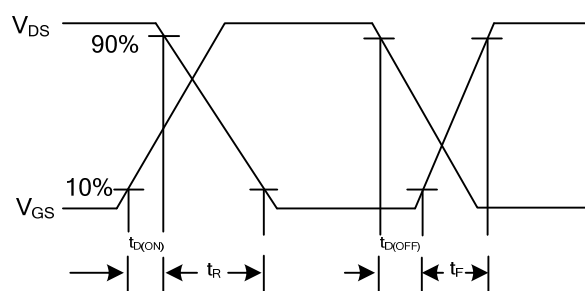


Peak Diode Recovery dv/dt Waveforms

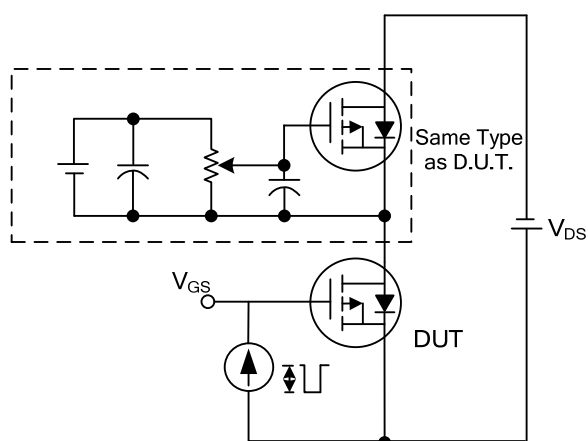
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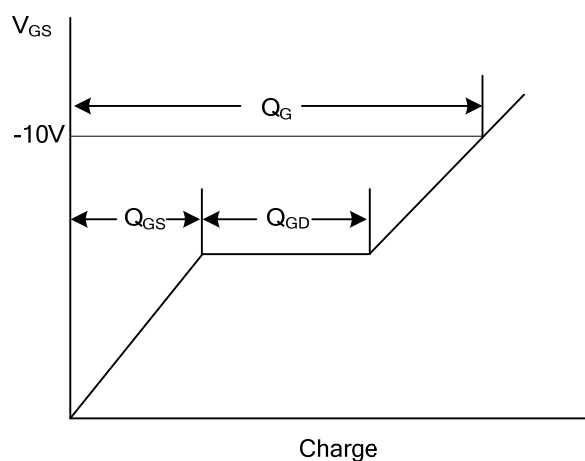
Switching Test Circuit



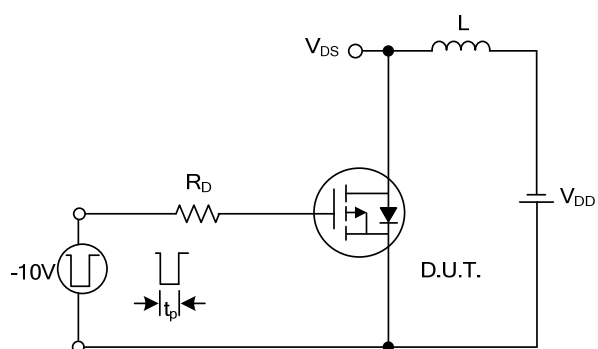
Switching Waveforms



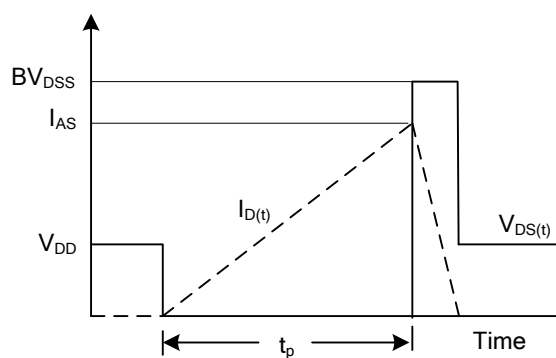
Gate Charge Test Circuit



Gate Charge Waveform



Unclamped Inductive Switching Test Circuit



Unclamped Inductive Switching Waveforms

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