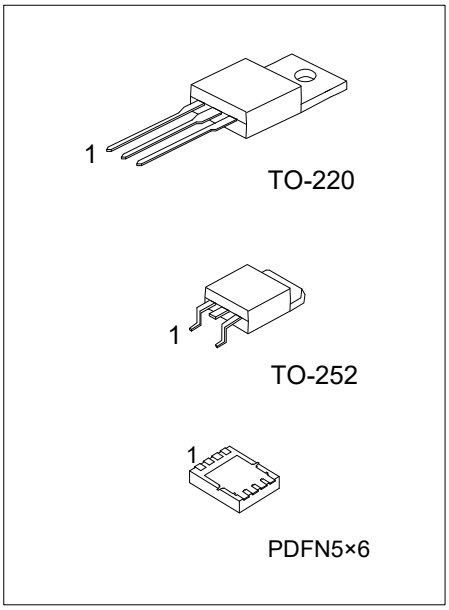
-70A, -40V P-CHANNEL POWER MOSFET



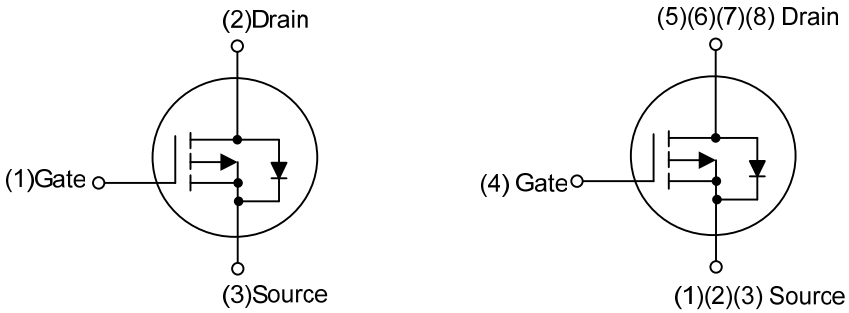
■ DESCRIPTION

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

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

■ SYMBOL

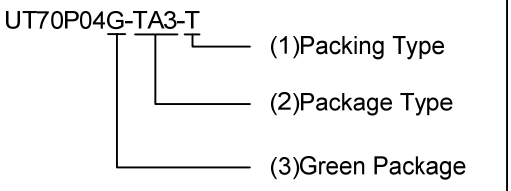


TO-220 / TO-252 PDFN5×6

■ 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	PDFN5×6	S	S	S	G	D	D	D	D	Tape Reel

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

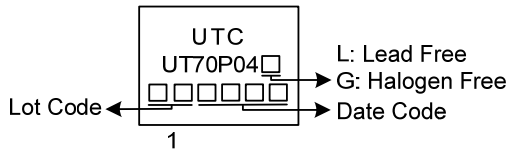
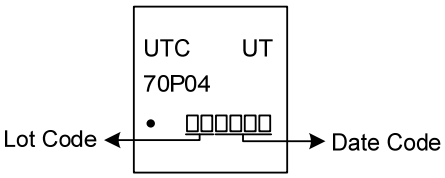


(1) T: Tube, R: Tape Reel

(2) TA3: TO-220, TN3: TO-252, P5060: PDFN5×6

(3) G: Halogen Free and Lead Free, L: Lead Free

■ MARKING

TO-220 / TO-252	PDFN5×6
	

■ ABSOLUTE MAXIMUM RATINGS (T_J=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	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 = 0.1mH, I_{AS} = -31A, V_{DD} = -50V, R_G = 25Ω, Starting T_J = 25°C
4. I_{SD} ≤ -25A, di/dt ≤ 200A/μs, V_{DD} ≤ BV_{DSS}, Starting T_J = 25°C

■ THERMAL DATA

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

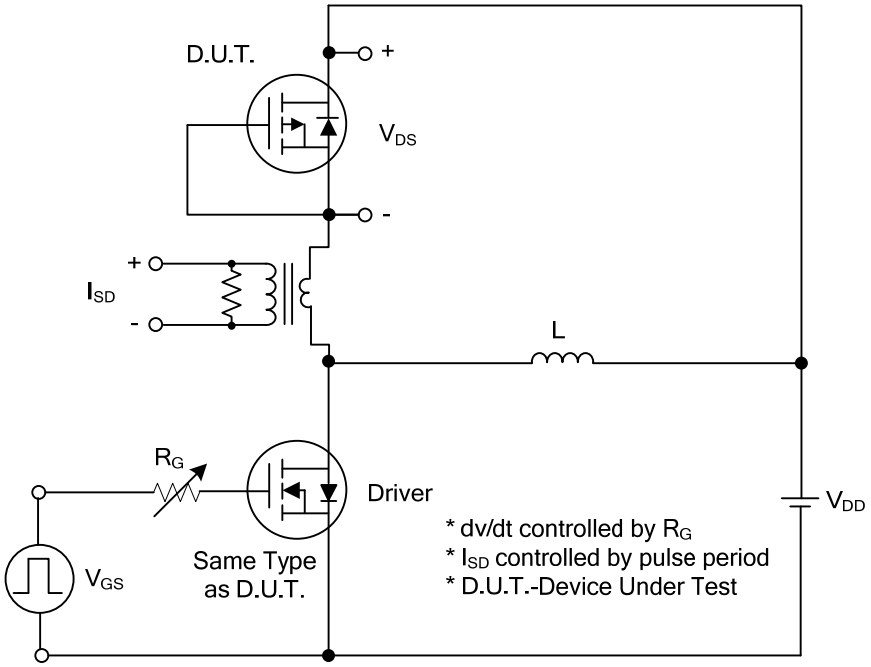
Note: Device mounted on FR-4 substrate PC board, 2oz copper, with 1inch square copper plate.

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

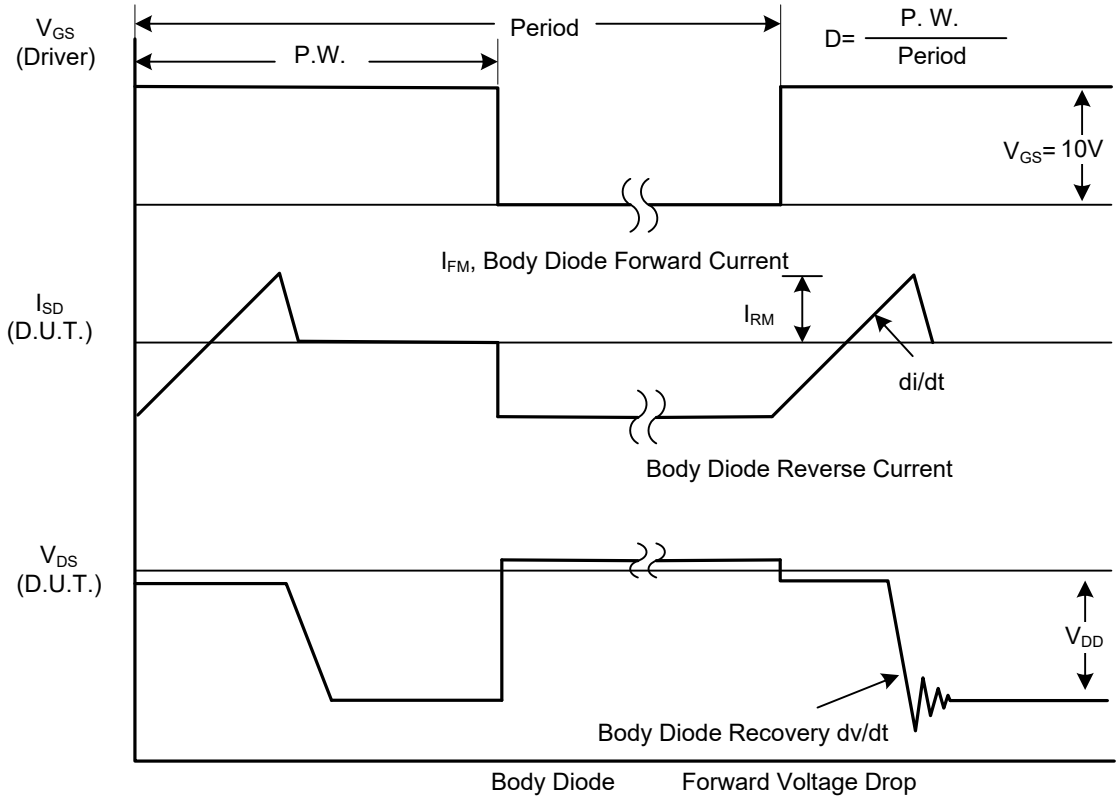
PARAMETER		SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
OFF CHARACTERISTICS							
Drain-Source Breakdown Voltage		BV_{DSS}	I_D=-250μA, V_{GS}=0V	-40			V
Drain-Source Leakage Current		I_{DSS}	V_{DS}=-40V, V_{GS}=0V			-1	μA
Gate- Source Leakage Current	Forward	I_{GSS}	V_{GS}=+20V, V_{DS}=0V			100	nA
	Reverse		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, dI_F/dt=100A/μs		86		ns
Body Diode Reverse Recovery Charge		Q_{rr}			172		nC

Notes: 1. Pulse Test: Pulse width ≤ 300μs, Duty cycle ≤ 2%.
2. Essentially independent of operating ambient temperature.

■ TEST CIRCUITS AND WAVEFORMS

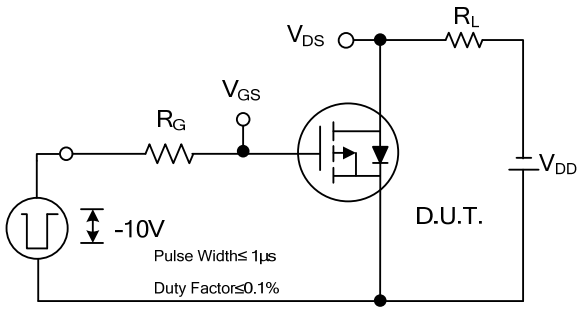


Peak Diode Recovery dv/dt Test Circuit

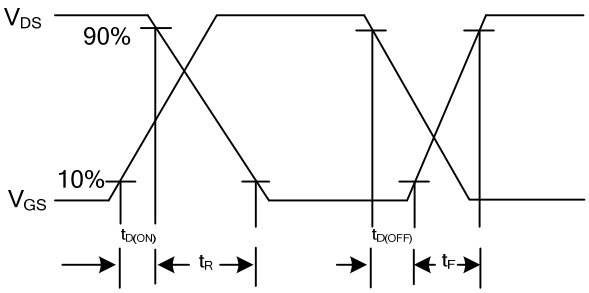


Peak Diode Recovery dv/dt Waveforms

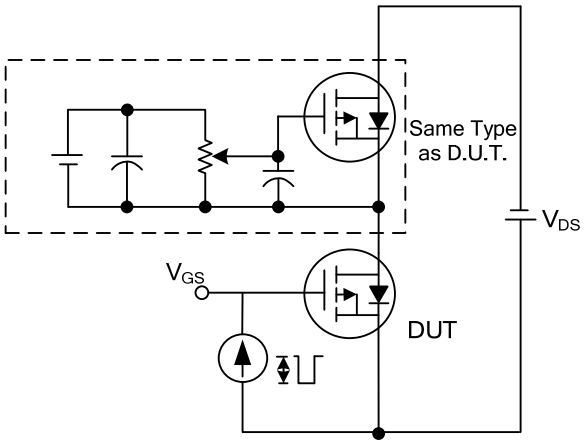
■ TEST CIRCUITS AND WAVEFORMS



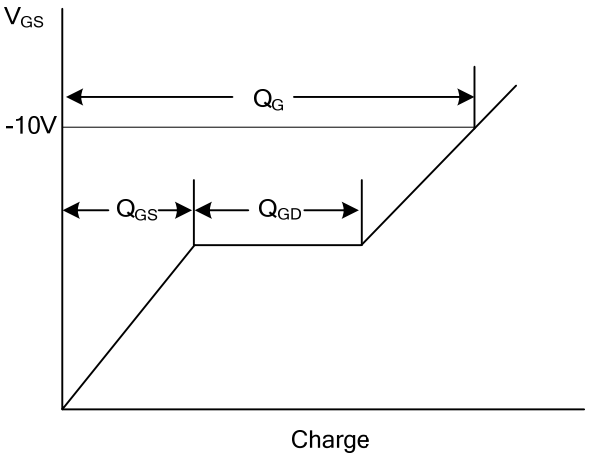
Switching Test Circuit



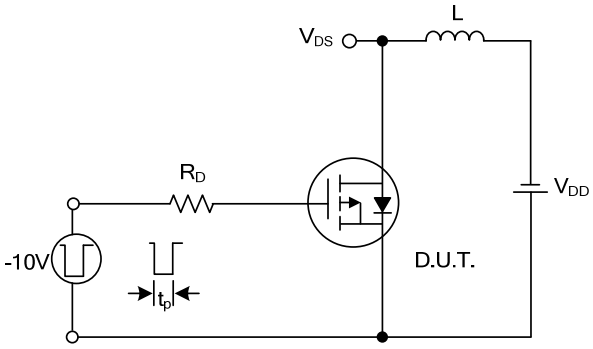
Switching Waveforms



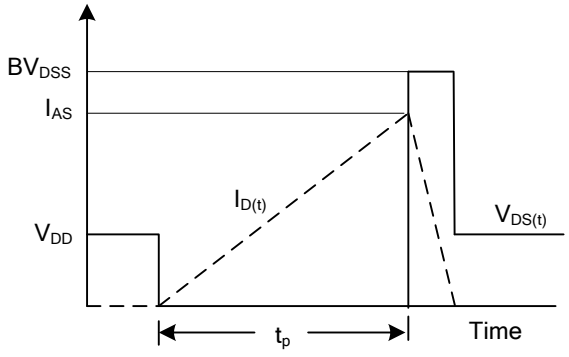
Gate Charge Test Circuit



Gate Charge Waveform



Unclamped Inductive Switching Test Circuit



Unclamped Inductive Switching Waveforms