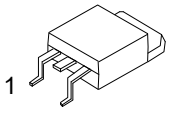
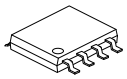
45A, 40V N-CHANNEL POWER MOSFET

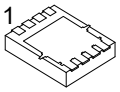


TO-252



SOP-8

PDFN3×3



PDFN5×6

■ DESCRIPTION

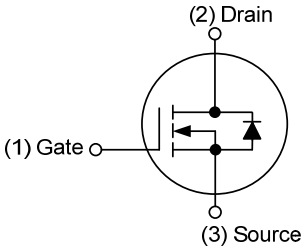
The UTC **UT45N04** is a N-channel power MOSFET providing very low on-resistance. It has high efficiency and perfect cost-effectiveness. This device is ideal for load switch and battery protection applications. For example in applications such as switching regulators, switching converters, motor drivers and relay drivers.

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

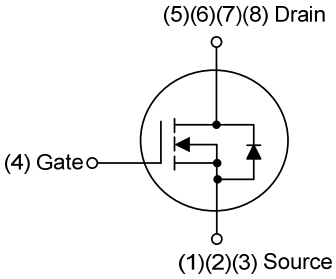
■ FEATURES

* $R_{DS(on)}$ ≤ 8.5 mΩ @ V_{GS}=10V, I_D=20A
  $R_{DS(on)}$ ≤ 12 mΩ @ V_{GS}=4.5V, I_D=20A
* High breakdown voltage

■ SYMBOL



TO-252



SOP-8/DFN3030-8
DFN5060-8

■ ORDERING INFORMATION

Ordering Number		Package	Pin Assignment								Packing
Lead Free	Halogen Free		1	2	3	4	5	6	7	8	
UT45N04L-TN3-R	UT45N04G-TN3-R	TO-252	G	D	S	-	-	-	-	-	Tape Reel
UT45N04L-S08-R	UT45N04G-S08-R	SOP-8	S	S	S	G	D	D	D	D	Tape Reel
UT45N04L-P3030-R	UT45N04G-P3030-R	PDFN3×3	S	S	S	G	D	D	D	D	Tape Reel
UT45N04L-P5060-R	UT45N04G-P5080-R	PDFN5×6	S	S	S	G	D	D	D	D	Tape Reel

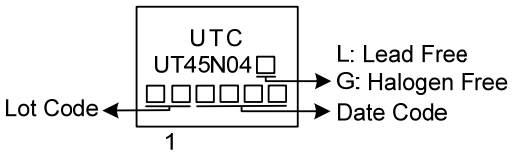
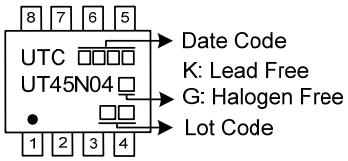
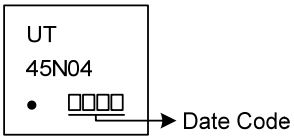
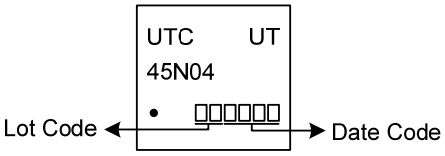
Note: Pin Assignment: G: Gate D: Drain S: Source

UT45N04G-TN3-R

(1)Packing Type
(2)Package Type
(3)Green Package

(1) R: Tape Reel
(2) TN3: TO-252, S08: SOP-8, P3030: PDFN3×3
P5060: PDFN5×6
(3) G: Halogen Free and Lead Free, K: Lead Free

■ MARKING

TO-252	SOP-8
	
PDFN3×3	**PDFN5×6**
	

■ 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	TO-252 PDFN5×6 PDFN3×3	I_D	45	A
		SOP-8		15	A
	Pulsed		I_{DM}	135	A
Single Pulsed Avalanche Energy (Note 3)			E_{AS}	31	mJ
Peak Diode Recovery dv/dt (Note 4)			dv/dt	2.1	V/ns
Power Dissipation	TO-252		P_D	45	W
	SOP-8			5	W
	PDFN3×3			31	W
	PDFN5×6			40	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=0.1mH, I_{AS}=25A, V_{DD}=20V, R_G=25 Ω, Starting T_J = 25°C
4. I_{SD} ≤ 30A, di/dt ≤ 200A/μs, V_{DD} ≤ BV_{DSS}, Starting T_J = 25°C

■ THERMAL DATA

PARAMETER		SYMBOL	RATINGS	UNIT
Junction to Ambient	TO-252	θ_{JA}	50	°C/W
	PDFN3×3		75	°C/W
	SOP-8		125	°C/W
	PDFN5×6		65	°C/W
Junction to Case	TO-252	θ_{JC}	2.7	°C/W
	SOP-8		25	°C/W
	PDFN3×3		4.03	°C/W
	PDFN5×6		3.125	°C/W

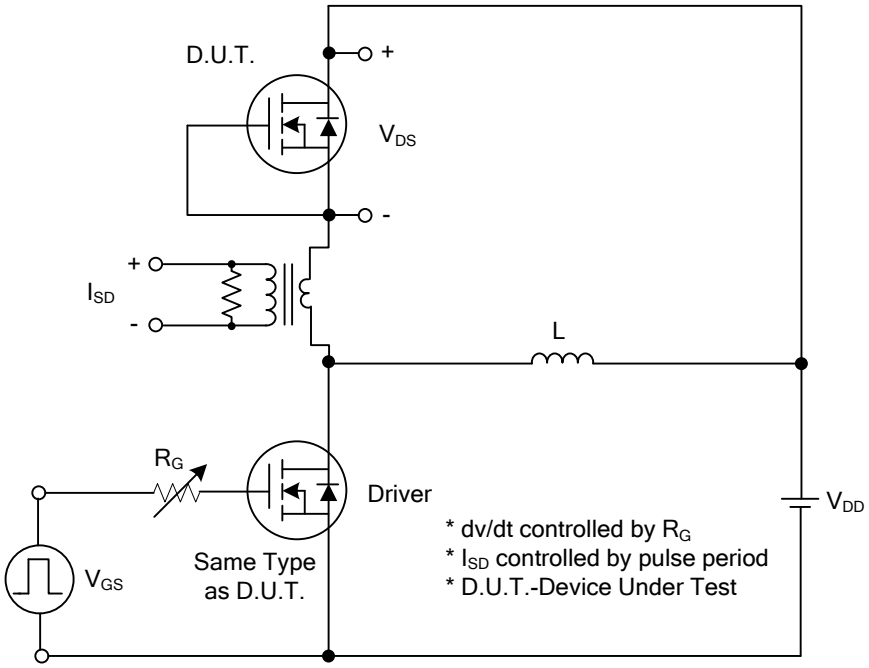
Note: Device mounted on FR-4 substrate P_C board, 2oz copper, with 1inch square copper plate.

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

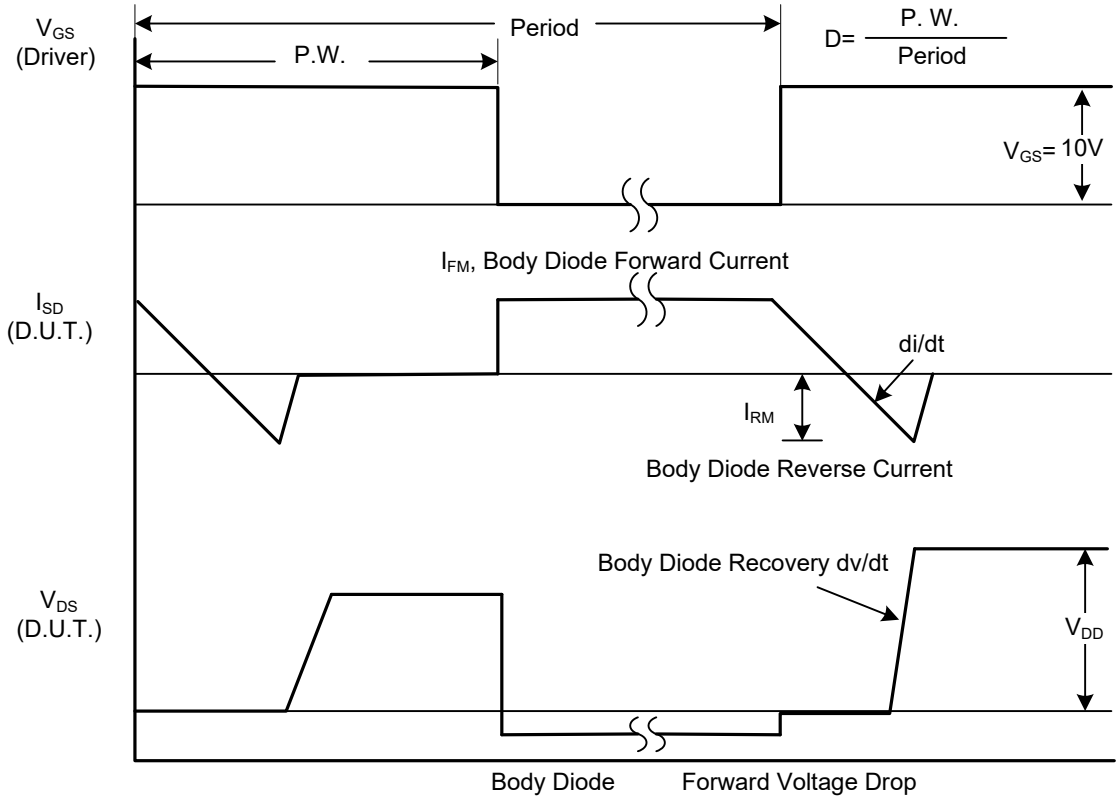
PARAMETER		SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
OFF CHARACTERISTICS							
Drain-Source Breakdown Voltage		BV_{DSS}	I_D=250μA, V_{GS}=0V	40			V
Drain-Source Leakage Current		I_{DSS}	V_{DS}=40V, V_{GS}=0V			1	μA
Gate-Source Leakage Current	Forward	I_{GSS}	V_{GS}=+10V, V_{DS}=0V			+100	nA
	Reverse		V_{GS}=-10V, 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=20A			8.5	mΩ
			V_{GS}=4.5V, I_D=20A			12	mΩ
DYNAMIC PARAMETERS							
Input Capacitance		C_{ISS}	V_{GS}=0V, V_{DS}=25V, f=1.0MHz		1520		pF
Output Capacitance		C_{OSS}			185		pF
Reverse Transfer Capacitance		C_{RSS}			155		pF
SWITCHING PARAMETERS							
Total Gate Charge		Q_G	V_{DS}=32V, V_{GS}=4.5V, I_D=45A (Note 1, 2)		26		nC
Gate to Source Charge		Q_{GS}			5		nC
Gate to Drain Charge		Q_{GD}			11		nC
Turn-ON Delay Time		$t_{D(ON)}$	V_{DS}=20V, V_{GS}=4.5V, I_D=45A, R_G=3.3Ω (Note 1, 2)		13		ns
Rise Time		t_R			20		ns
Turn-OFF Delay Time		$t_{D(OFF)}$			36		ns
Fall-Time		t_F			25		ns
SOURCE- DRAIN DIODE RATINGS AND CHARACTERISTICS							
Maximum Body-Diode Continuous Current		I_S				45	A
Maximum Body-Diode Pulsed Current		I_{SM}				90	A
Drain-Source Diode Forward Voltage		V_{SD}	I_S=45A, V_{GS}=0V			1.4	V
Reverse Recovery Time (Note 1)		t_{rr}	I_S=30A , V_{GS}=0V, di/dt=100A/μs		30		ns
Reverse Recovery Charge		Q_{rr}			12		nC

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

■ TEST CIRCUITS AND WAVEFORMS

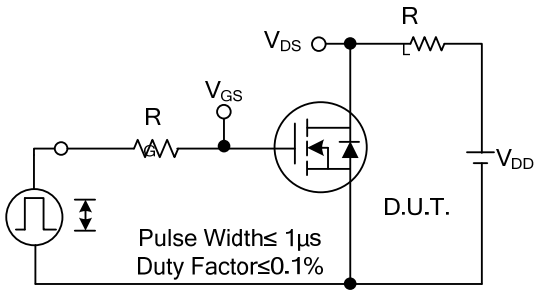


Peak Diode Recovery dv/dt Test Circuit

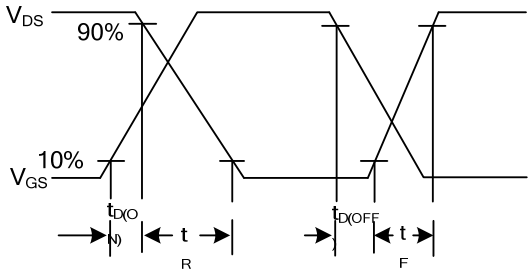


Peak Diode Recovery dv/dt Waveforms

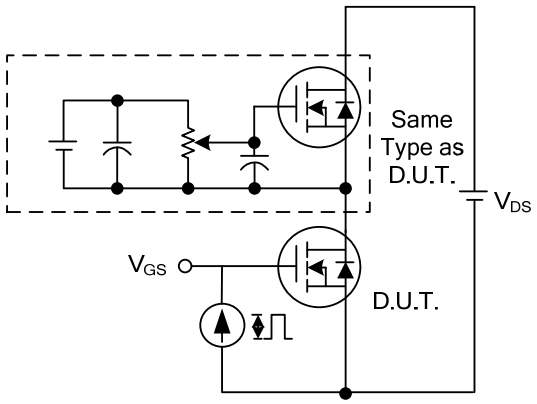
■ TEST CIRCUITS AND WAVEFORMS



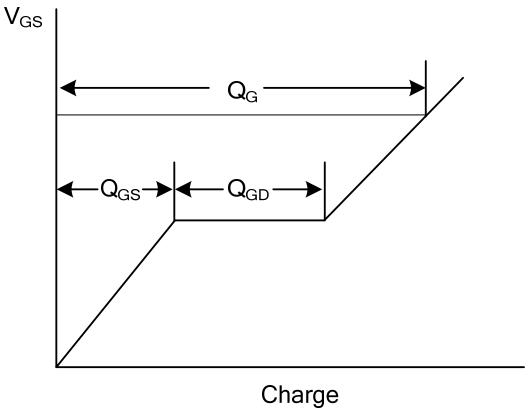
Switching Test Circuit



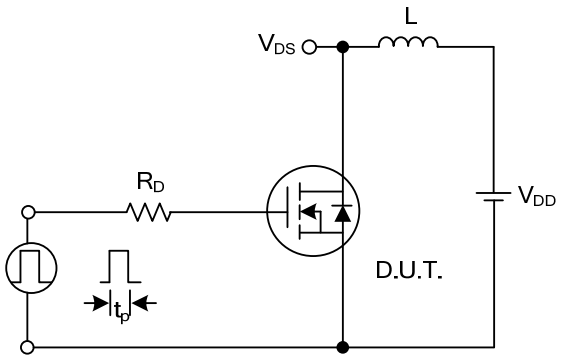
Switching Waveforms



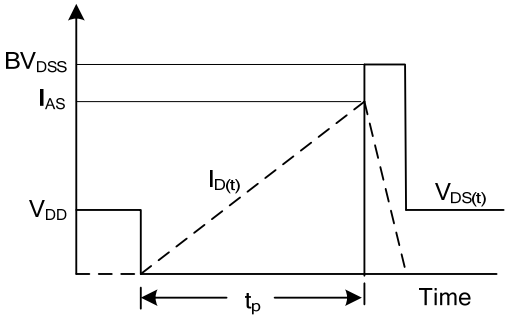
Gate Charge Test Circuit



Gate Charge Waveform



Unclamped Inductive Switching Test Circuit



Unclamped Inductive Switching Waveforms