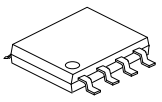
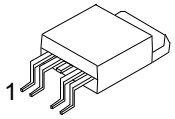
DUAL ENHANCEMENT MODE (N-CHANNEL / P-CHANNEL)



SOP-8



TO-252-4

■ DESCRIPTION

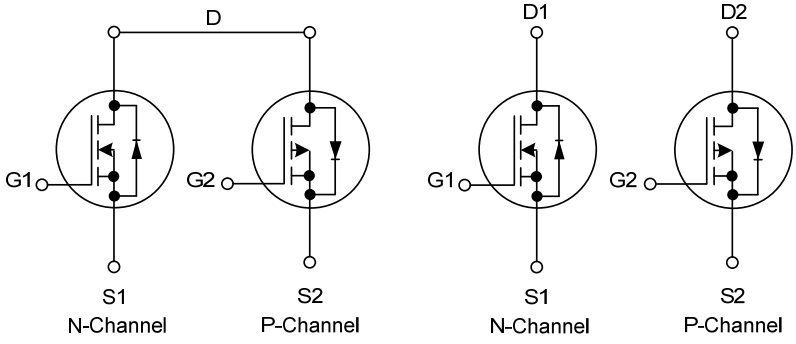
The UTC **UT8NP04** incorporates a N-channel MOSFET and a P-channel MOSFET，it uses UTC's advanced technology to provide customers a minimum on-state resistance, high switching speed, low gate charge and cost effectiveness.

The UTC **UT8NP04** is universally applied in low voltage applications.

■ FEATURES

*N-CHANNEL
$R_{DS(on)}$ ≤ 18 mΩ @ V_{GS}=10V, I_D=4.0A
$R_{DS(on)}$ ≤ 30 mΩ @ V_{GS}=4.5V, I_D=4.0A
*P-CHANNEL
$R_{DS(on)}$ ≤ 50 mΩ @ V_{GS}=-10V, I_D=-4.0A
$R_{DS(on)}$ ≤ 68 mΩ @ V_{GS}=-4.5V, I_D=-4.0A
* High switching speed

■ SYMBOL

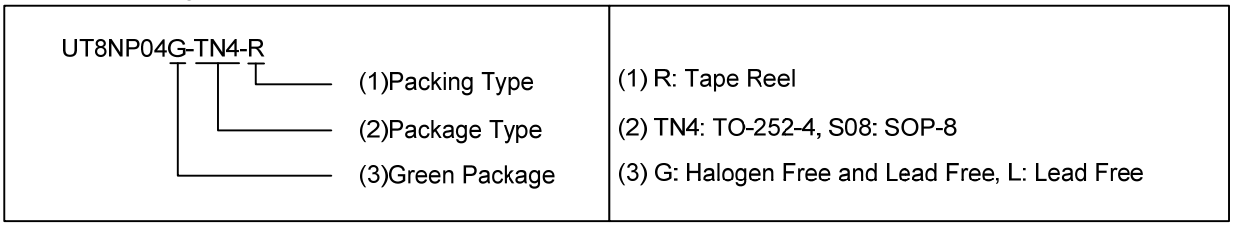


TO-252-4 SOP-8

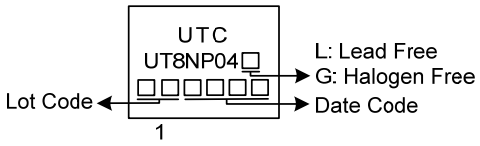
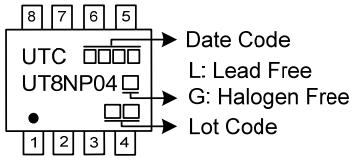
■ ORDERING INFORMATION

Ordering Number		Package	Pin Assignment								Packing
Lead Free	Halogen Free		1	2	3	4	5	6	7	8	
UT8NP04L-TN4-R	UT8NP04G-TN4-R	TO-252-4	S1	G1	D	S2	G2	-	-	-	Tape Reel
UT8NP04L-S08-R	UT8NP04G-S08-R	SOP-8	S1	G1	S2	G2	D2	D2	D1	D1	Tape Reel

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



■ MARKING

TO-252-4	SOP-8
	

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

PARAMETER			SYMBOL	RATINGS		UNIT
				N-CHANNEL	P-CHANNEL	
Drain-Source Voltage			V_{DSS}	40	-40	V
Gate-Source Voltage			V_{GSS}	±20	±20	V
Drain Current	Continuous	TO-252-4	I_D	16	-16	A
		SOP-8		8	-8	A
	Pulsed (Note 1)	TO-252-4	I_{DM}	32	-32	A
		SOP-8		16	-16	A
Avalanche Energy, Single Pulse (Note 3)			E_{AS}	23	25.5	mJ
Power Dissipation		TO-252-4	P_D	43		W
		SOP-8		1.6		W
Junction Temperature			T_J	-55 ~ +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. N-Channel: L=0.1mH, I_{AS}=21.4A, V_{DD}=30V, R_G=25Ω, Starting T_J=25°C
P-Channel: L=0.1mH, I_{AS}=-22.5A, V_{DD}=-30V, R_G=25Ω, Starting T_J=25°C

■ THERMAL DATA (NOTE)

PARAMETER		SYMBOL	RATINGS	UNIT
Junction to Ambient	TO-252-4	θ_{JA}	110	°C/W
	SOP-8		90	°C/W
Junction to Case	TO-252-4	θ_{JC}	2.9	°C/W
	SOP-8		78	°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)

N-Channel

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			+100	nA
	Reverse		V_{GS}=-20V			-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 (Note 2)		$R_{DS(ON)}$	V_{GS}=10V, I_D=4.0A			18	mΩ
			V_{GS}=4.5V, I_D=4.0A			30	mΩ
DYNAMIC PARAMETERS							
Input Capacitance		C_{ISS}	V_{GS}=0V, V_{DS}=20V, f=1.0MHz		678.9		pF
Output Capacitance		C_{OSS}			91.9		pF
Reverse Transfer Capacitance		C_{RSS}			75.9		pF
SWITCHING PARAMETERS							
Total Gate Charge (Note 2)		Q_G	V_{DS}=32V, V_{GS}=10V, I_D=8.0A, I_G=1mA (Note 1, 2)		23.8		nC
Gate to Source Charge		Q_{GS}			3.4		nC
Gate to Drain Charge		Q_{GD}			6.6		nC
Turn-ON Delay Time (Note 2)		$t_{D(ON)}$	V_{Ds}=20V, V_{GS}=10V, I_D=8.0A, R_G=6Ω (Note 1, 2)		4.9		ns
Rise Time		t_R			16.3		ns
Turn-OFF Delay Time		$t_{D(OFF)}$			22.5		ns
Fall-Time		t_F			18.7		ns
SOURCE- DRAIN DIODE RATINGS AND CHARACTERISTICS							
Drain-Source Diode Forward Voltage(Note 2)		V_{SD}	I_S=8.0A, V_{GS}=0V			1.4	V
Body Diode Reverse Recovery Time		t_{rr}	I_S=8.0A, V_{GS}=0V, dI_F/dt=100A/μs		39		nS
Body Diode Reverse Recovery Charge		Q_{rr}			40		nC

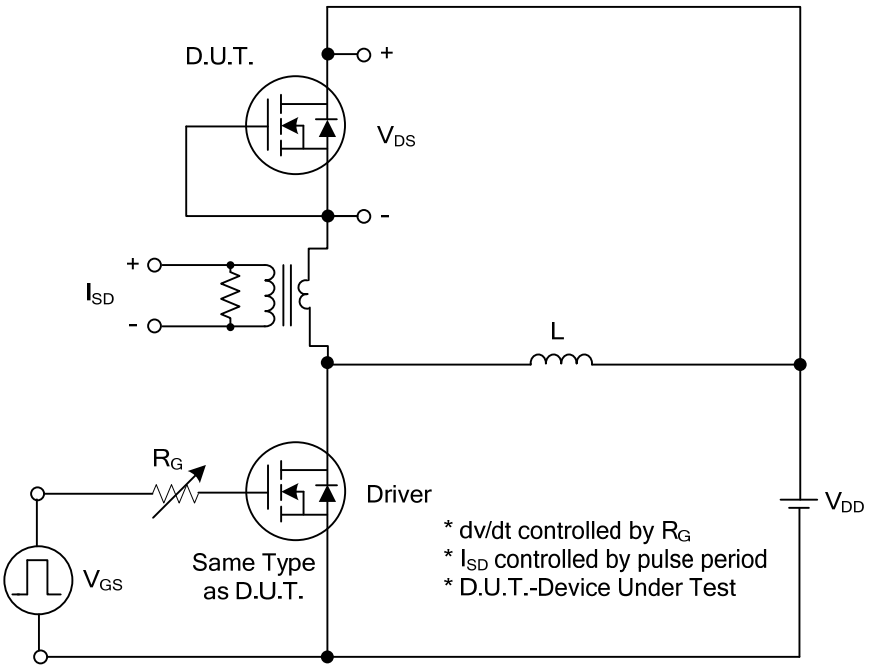
■ ELECTRICAL CHARACTERISTICS (Cont.)

P-Channel

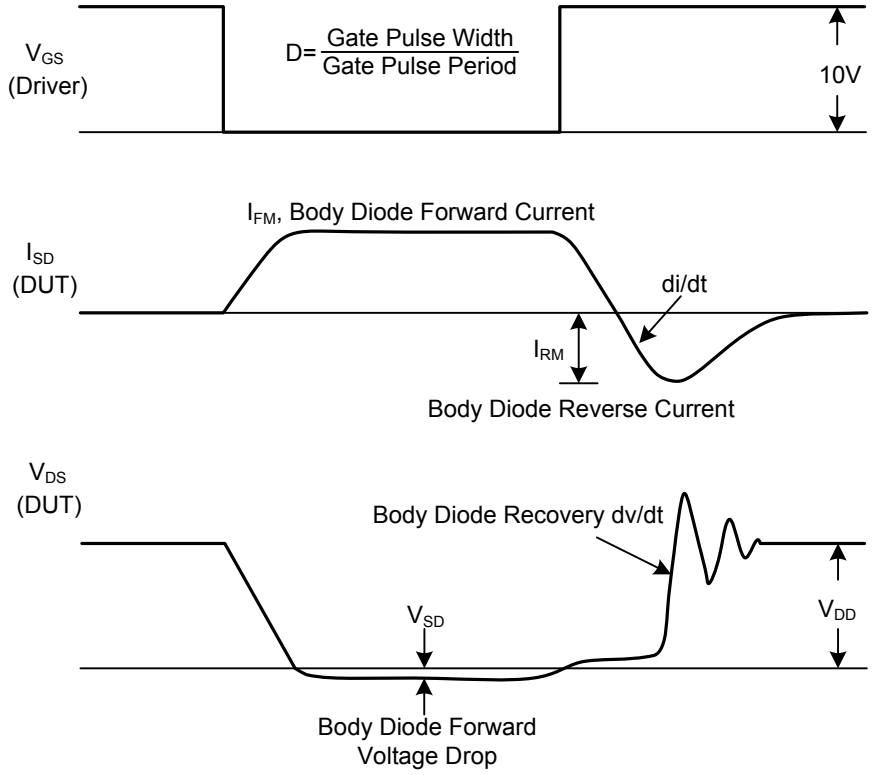
PARAMETER		SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
OFF CHARACTERISTICS							
Drain-Source Breakdown Voltage		BV_{DSS}	I_D=-250μA, V_{GS}=0V	-40			V
Drain-Source Leakage Current		I_{DSS}	V_{DS}=-40V, V_{GS}=0V			-1	μA
Gate-Source Leakage Current	Forward	I_{GSS}	V_{GS}=+20V			+100	nA
	Reverse		V_{GS}=-20V			-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 (Note 2)		$R_{DS(ON)}$	V_{GS}=-10V, I_D=-4.0A			50	mΩ
			V_{GS}=-4.5V, I_D=-4.0A			68	mΩ
DYNAMIC PARAMETERS							
Input Capacitance		C_{ISS}	V_{GS}=0V, V_{DS}=-20V, f=1.0MHz		784.7		pF
Output Capacitance		C_{OSS}			111.9		pF
Reverse Transfer Capacitance		C_{RSS}			91.5		pF
SWITCHING PARAMETERS							
Total Gate Charge (Note 2)		Q_G	V_{DS}=-32V, V_{GS}=-10V, I_D=-8.0A, I_G=-1mA (Note 1, 2)		23.2		nC
Gate to Source Charge		Q_{GS}			3		nC
Gate to Drain Charge		Q_{GD}			6.7		nC
Turn-ON Delay Time (Note 2)		$t_{D(ON)}$	V_{DS}=-20V, V_{GS}=-10V, I_D=-8.0A, R_G=6Ω (Note 1, 2)		5.5		ns
Rise Time		t_R			16.7		ns
Turn-OFF Delay Time		$t_{D(OFF)}$			32.2		ns
Fall-Time		t_F			21		ns
SOURCE- DRAIN DIODE RATINGS AND CHARACTERISTICS							
Drain-Source Diode Forward Voltage(Note 2)		V_{SD}	I_S=-8.0A, V_{GS}=0V			-1.4	V
Body Diode Reverse Recovery Time		t_{rr}	I_S=-8.0A, V_{GS}=0V, dI_F/dt=100A/μs		56.6		nS
Body Diode Reverse Recovery Charge		Q_{rr}			130		nC

Notes: 1. Pulse width limited by maximum junction temperature
2. Pulse width ≤ 300μs, Duty cycle ≤ 2%

■ TEST CIRCUITS AND WAVEFORMS

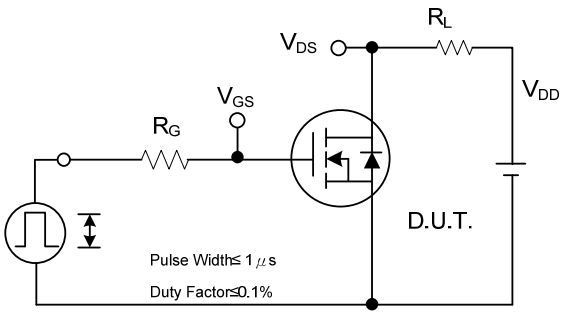


Peak Diode Recovery dv/dt Test Circuit

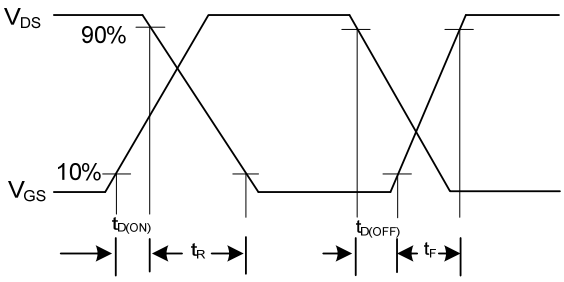


Peak Diode Recovery dv/dt Waveforms

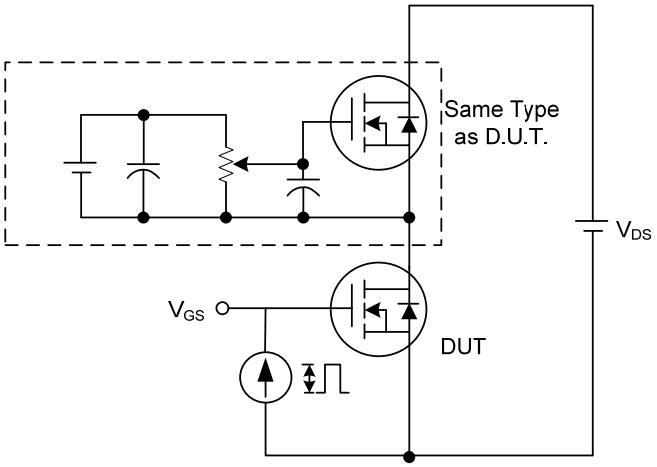
■ TEST CIRCUITS AND WAVEFORMS



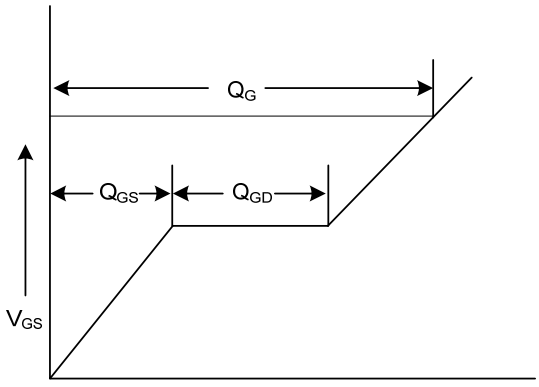
Switching Test Circuit



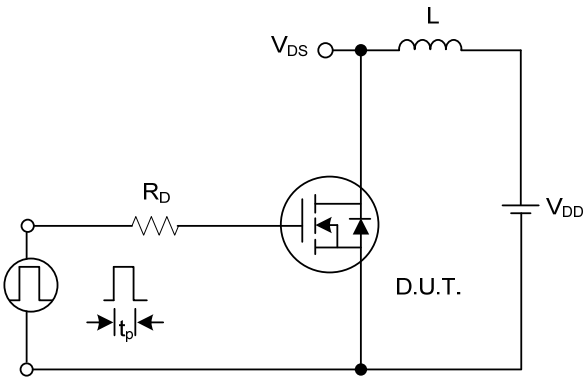
Switching Waveforms



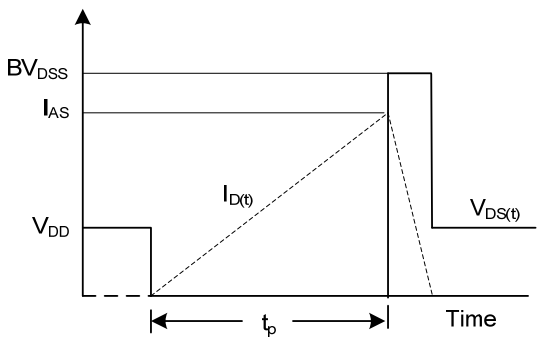
Gate Charge Test Circuit



Gate Charge Waveform



Unclamped Inductive Switching Test Circuit



Unclamped Inductive Switching Waveforms