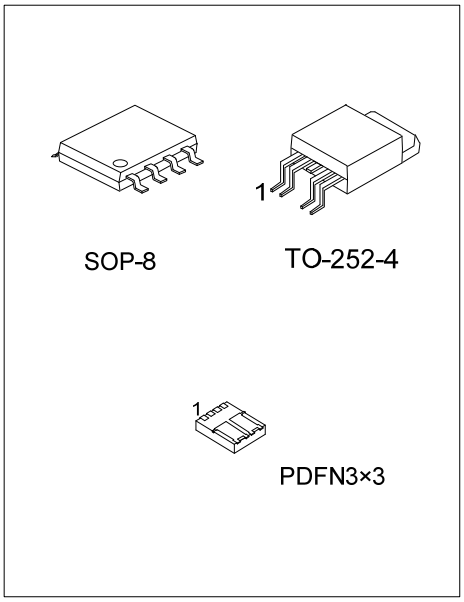
UT15NP06

Power MOSFET

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



■ DESCRIPTION

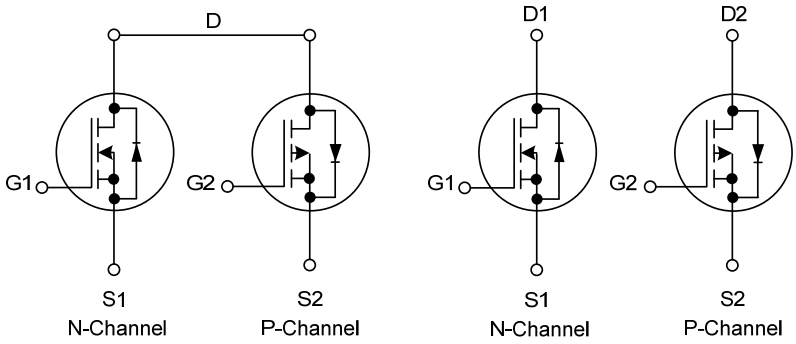
The UTC **UT15NP06** incorporates a N-channel MOSFET and a P-channel MOSFET，it uses UTC's advanced technology to provide customers a minimum on-state resistance, high switching speed, low gate charge and cost effectiveness.

The UTC **UT15NP06** is universally applied in low voltage applications.

■ FEATURES

*N-CHANNEL
$R_{DS(on)}$ ≤ 60 mΩ @ V_{GS}=10V, I_D=12A
$R_{DS(on)}$ ≤ 110 mΩ @ V_{GS}=4.5V, I_D=8.0A
*P-CHANNEL
$R_{DS(on)}$ ≤ 115 mΩ @ V_{GS}=-10V, I_D=-12A
$R_{DS(on)}$ ≤ 170 mΩ @ V_{GS}=-4.5V, I_D=-8.0A
* High switching speed

■ SYMBOL



TO-252-4 SOP-8 / PDFN3×3

■ ORDERING INFORMATION

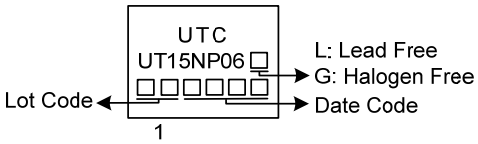
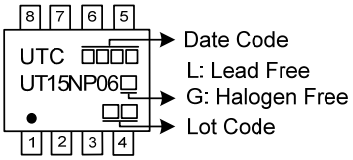
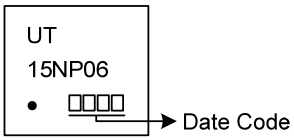
Ordering Number		Package	Pin Assignment								Packing
Lead Free	Halogen Free		1	2	3	4	5	6	7	8	
UT15NP06L-TN4-R	UT15NP06G-TN4-R	TO-252-4	S1	G1	D	S2	G2	-	-	-	Tape Reel
UT15NP06L-S08-R	UT15NP06G-S08-R	SOP-8	S1	G1	S2	G2	D2	D2	D1	D1	Tape Reel
UT15NP06L-P3030-R	UT15NP06G-P3030-R	PDFN3×3	S1	G1	S2	G2	D2	D2	D1	D1	Tape Reel

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

UT15NP06G-TN4-R
(1)Packing Type
(2)Package Type
(3)Green Package

(1) R: Tape Reel
(2) TN4: TO-252-4, S08: SOP-8, P3030: PDFN3×3
(3) G: Halogen Free and Lead Free, L: Lead Free

■ MARKING

PACKAGE	MARKING
TO-252-4	
SOP-8	
PDFN3×3	

■ ABSOLUTE MAXIMUM RATINGS

PARAMETER			SYMBOL	RATINGS		UNIT
				N-CHANNEL	P-CHANNEL	
Drain-Source Voltage			V_{DSS}	60	-60	V
Gate-Source Voltage			V_{GSS}	±20	±20	V
Drain Current	Continuous	T_A=25°C	I_D	15	-15	A
	Pulsed (Note 1)		I_{DM}	30	-30	A
Avalanche Energy, Single Pulse (Note 2)			EAS	9.8	17	mJ
Power Dissipation	T_C=25°C	TO-252-4	P_D	36		W
		SOP-8		1.25		W
		PDFN3×3		28		W
Junction Temperature			T_J	-55 ~ +150		°C
Storage Temperature Range			T_{STG}	-55 ~ +150		°C

Note: 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. N-Channel: L=0.1mH, I_{AS}=14A, V_{DD}=50V, R_G=25Ω, Starting T_J=25°C
   P-Channel: L=0.1mH, I_{AS}=-18.6A, V_{DD}=-50V, R_G=25Ω, Starting T_J=25°C

■ THERMAL DATA

PARAMETER		SYMBOL	RATINGS	UNIT
Junction to Ambient	TO-252-4	θ_{JA}	110	°C/W
	SOP-8		125	°C/W
	PDFN3×3		60	°C/W
Junction to Case	TO-252-4	θ_{JC}	3.47	°C/W
	SOP-8		100	°C/W
	PDFN3×3		4.46	°C/W

Note: The data tested by surface mounted on a 1 inch^2 FR-4 board with 2OZ copper.

■ 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}	V_{GS}=0V, I_D=250μA	60			V
Drain-Source Leakage Current	I_{DSS}	V_{DS}=60V, V_{GS}=0V			1	μA
Gate-Source Leakage Current	I_{GSS}	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
Drain to Source On-state Resistance	$R_{DS(ON)}$	V_{GS}=10V, I_D=12A		50	60	mΩ
		V_{GS}=4.5V, I_D=8.0A		72	110	mΩ
DYNAMIC PARAMETERS						
Input Capacitance	C_{ISS}	V_{DS}=25V, V_{GS}=0V, f=1.0MHz		380		pF
Output Capacitance	C_{OSS}			42		pF
Reverse Transfer Capacitance	C_{RSS}			30		pF
SWITCHING PARAMETERS						
Total Gate Charge (Note)	Q_G	V_{GS}=10V, V_{DS}=48V, I_D=12A		15		nC
Gate Source Charge	Q_{GS}			2.8		nC
Gate Drain Charge	Q_{GD}			3		nC
Turn-ON Delay Time (Note)	$t_{D(ON)}$	V_{DD}=30V, V_{GS}=10V, I_D=12A, R_G=3.3Ω		5		ns
Turn-ON Rise Time	t_R			16		ns
Turn-OFF Delay Time	$t_{D(OFF)}$			17		ns
Turn-OFF Fall-Time	t_F			18		ns
SOURCE- DRAIN DIODE RATINGS AND CHARACTERISTICS						
Drain-Source Diode Forward Voltage (Note)	V_{SD}	I_S =15A, V_{GS} =0V		1	1.4	V

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

■ ELECTRICAL CHARACTERISTICS (Cont.)

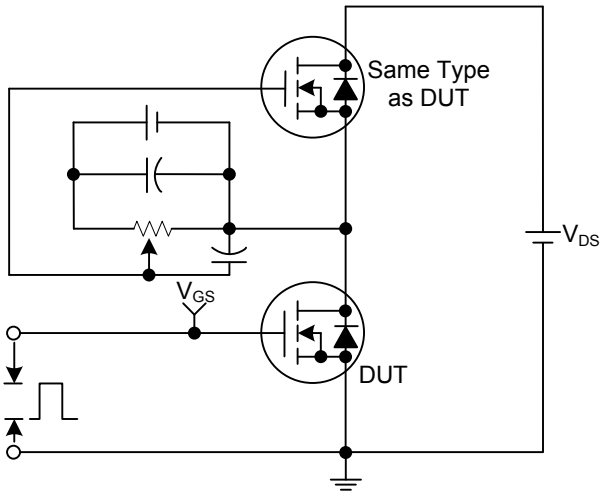
P-Channel

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
OFF CHARACTERISTICS						
Drain-Source Breakdown Voltage	BV_{DSS}	V_{GS}=0V, I_D=-250μA	-60			V
Zero Gate Voltage Drain Current	I_{DSS}	V_{DS}=-60V, V_{GS}=0V			-1	μA
Gate-to-Source Leakage Current	I_{GSS}	V_{GS}=±20V, V_{DS}=0V			±100	nA
ON CHARACTERISTICS						
Cutoff 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=-12A		85	115	mΩ
		V_{GS}=-4.5V, I_D=-8.0A		140	170	mΩ
DYNAMIC PARAMETERS						
Input Capacitance	C_{ISS}	V_{DS}=-20V, V_{GS}=0V, f=1.0MHz		800		pF
Output Capacitance	C_{OSS}			60		pF
Reverse Transfer Capacitance	C_{RSS}			45		pF
SWITCHING PARAMETERS						
Total Gate Charge	Q_G	V_{DS}=-48V, V_{GS}=-10V, I_D=-12A		20		nC
Gate to Source Charge	Q_{GS}			3.3		nC
Gate to Drain Charge	Q_{GD}			5		nC
Turn-ON Delay Time	$t_{D(ON)}$	V_{DS}=-30V, V_{GS}=-10V, I_D=-12A, R_G=3Ω		6		ns
Rise Time	t_R			16		ns
Turn-OFF Delay Time	$t_{D(OFF)}$			30		ns
Fall-Time	t_F			18		ns
SOURCE- DRAIN DIODE RATINGS AND CHARACTERISTICS						
Diode Forward Voltage	V_{SD}	I_S=-15.0A,V_{GS}=0V		-1	-1.4	V

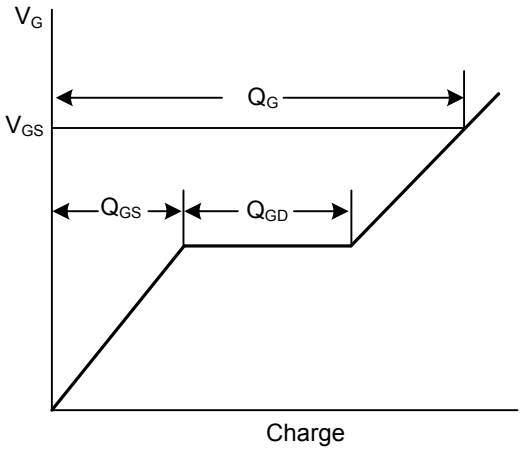
Notes: 1. Pulse width limited by maximum junction temperature
2. Pulse width ≤ 300μs, Duty cycle ≤ 2%

■ TEST CIRCUITS AND WAVEFORMS

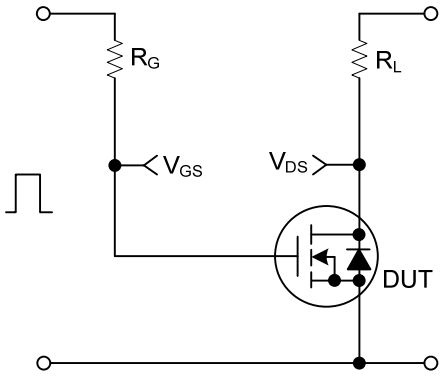
N-CHANNEL



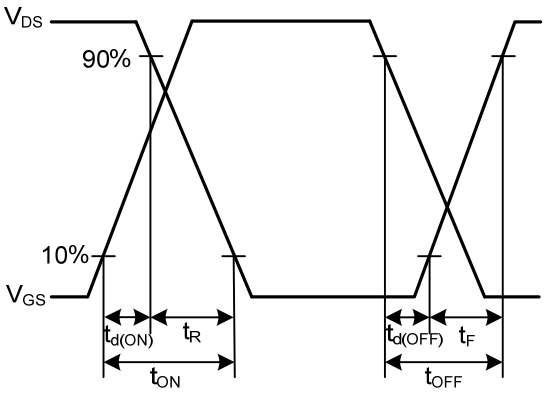
Gate Charge Test Circuit



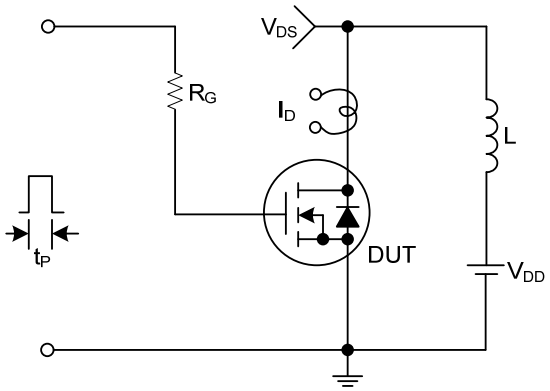
Gate Charge Waveforms



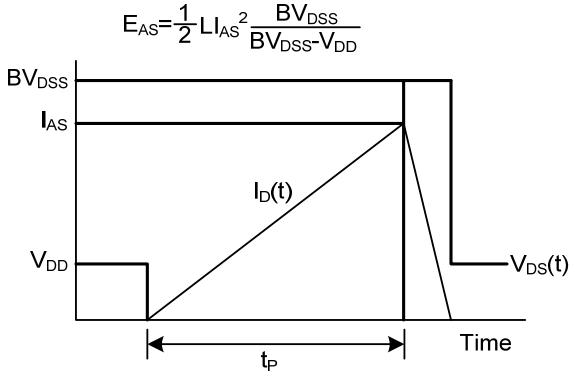
Resistive Switching Test Circuit



Resistive Switching Waveforms



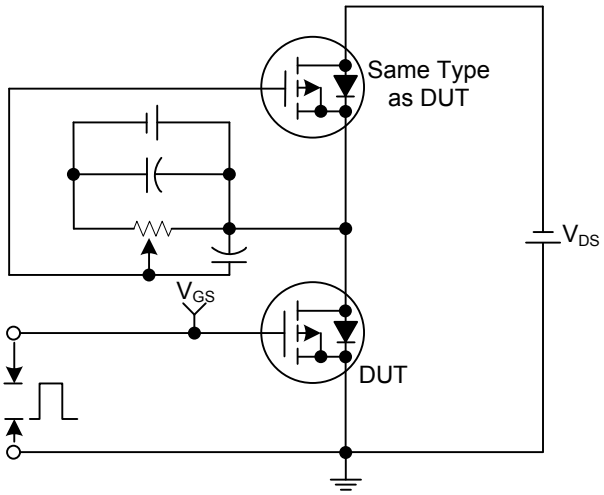
Unclamped Inductive Switching Test Circuit



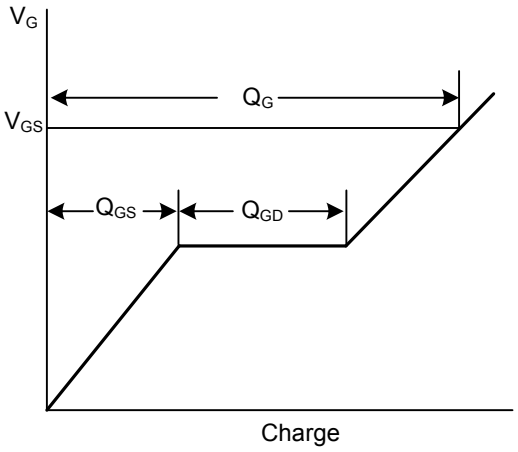
Unclamped Inductive Switching Waveforms

■ TEST CIRCUITS AND WAVEFORMS

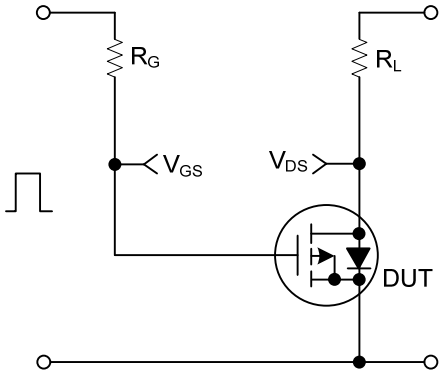
P-CHANNEL



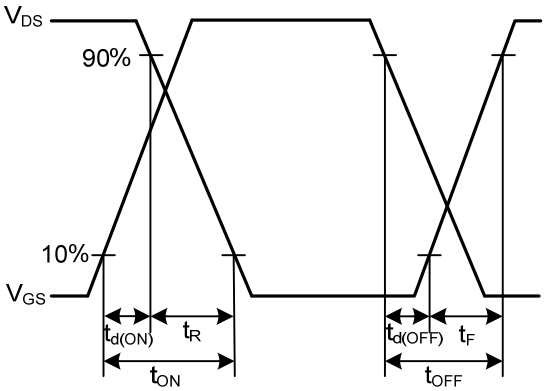
Gate Charge Test Circuit



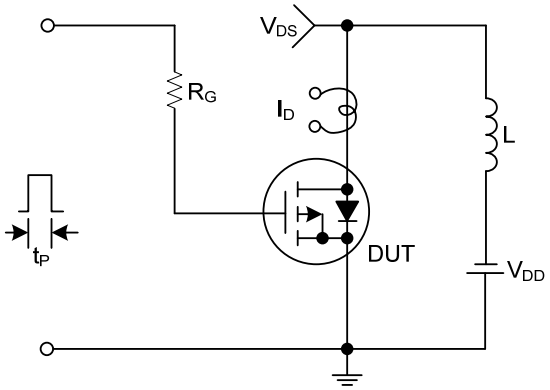
Gate Charge Waveforms



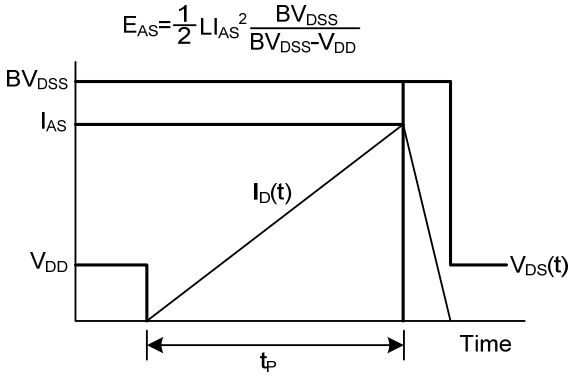
Resistive Switching Test Circuit



Resistive Switching Waveforms



Unclamped Inductive Switching Test Circuit



Unclamped Inductive Switching Waveforms

■ TYPICAL CHARACTERISTICS