



30V DUAL MIDDLE POWER MOSFET (N-CHANNEL/P-CHANNEL)

DESCRIPTION

The UTC **UT5300Z** is a 30V N-Channel & P-Channel middle Power MOSFET, it uses UTC's advanced technology to provide the customers with a minimum on state resistance, etc.

The UTC **UT5300Z** is suitable for switching.

FEATURES

* N-CHANNEL

$R_{DS(ON)} \leq 23 \text{ m}\Omega$ @ $V_{GS} = 10\text{V}$, $I_D = 5.6\text{A}$

$R_{DS(ON)} \leq 37 \text{ m}\Omega$ @ $V_{GS} = 4.5\text{V}$, $I_D = 5.0\text{A}$

* P-CHANNEL

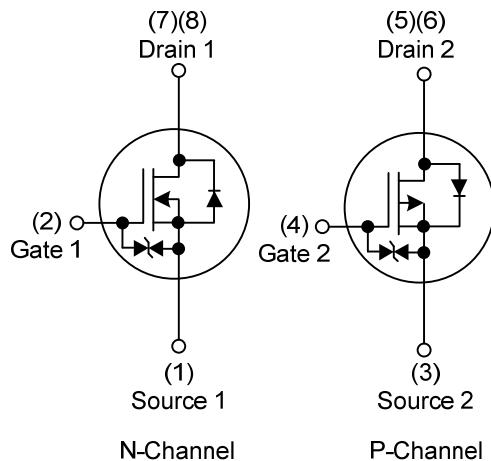
$R_{DS(ON)} \leq 47 \text{ m}\Omega$ @ $V_{GS} = -10\text{V}$, $I_D = -3.0\text{A}$

$R_{DS(ON)} \leq 84 \text{ m}\Omega$ @ $V_{GS} = -4.5\text{V}$, $I_D = -2.0\text{A}$

* Low on-resistance

* With ESD Protected

SYMBOL



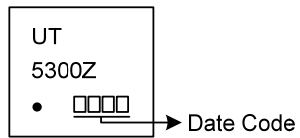
ORDERING INFORMATION

Ordering Number		Package	Pin Assignment								Packing
Lead Free	Halogen Free		1	2	3	4	5	6	7	8	
UT5300ZL-P3030-R	UT5300ZG-P3030-R	PDFN3×3	S1	G1	S2	G2	D2	D2	D1	D1	Tape Reel

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

UT5300ZG-P3030-R		(1)Packing Type	(1) R: Tape Reel
		(2)Package Type	(2) P3030: PDFN3×3
		(3)Green Package	(3) G: Halogen Free and Lead Free, K: Lead Free

■ MARKING



■ ABSOLUTE MAXIMUM RATING ($T_C=25^{\circ}\text{C}$, unless otherwise specified)

PARAMETER		SYMBOL	RATINGS		UNIT
			N-CHANNEL	P-CHANNEL	
Drain-Source Voltage		V_{DSS}	30	-30	V
Gate-Source Voltage		V_{GSS}	± 20	± 20	V
Drain Current	Continuous	I_D	5	-5	A
	Pulsed (Note 2)	I_{DM}	10	-10	A
Avalanche Energy	Single Pulsed (Note 3)	E_{AS}	42	25	mJ
Peak Diode Recovery dv/dt (Note 3)		dv/dt	1.2	1	V/nS
Power Dissipation		P_D	20		W
Junction Temperature		T_J	+150		$^{\circ}\text{C}$
Storage Temperature Range		T_{STG}	-55 ~ +150		$^{\circ}\text{C}$

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: $L = 1\text{mH}$, $I_{AS} = 9.2\text{A}$, $V_{DD} = 50\text{V}$, $R_G = 25\Omega$, Starting $T_J = 25^{\circ}\text{C}$.

P-CHANNEL: $L = 1\text{mH}$, $I_{AS} = -7.1\text{A}$, $V_{DD} = -50\text{V}$, $R_G = 25\Omega$, Starting $T_J = 25^{\circ}\text{C}$.

4. $I_{SD} \leq \pm 5.0\text{A}$, $di/dt \leq 200\text{A}/\mu\text{s}$, $V_{DD} \leq V_{(BR)DSS}$, $T_J \leq 25^{\circ}\text{C}$.

■ THERMAL DATA

PARAMETER	SYMBOL	RATINGS	UNIT
Junction to Ambient	θ_{JA}	75	$^{\circ}\text{C}/\text{W}$
Junction to Case	θ_{JC}	6.25	$^{\circ}\text{C}/\text{W}$

Note: The data tested by surface mounted on a 1 inch² FR-4 board with 2OZ copper.

■ ELECTRICAL CHARACTERISTICS ($T_J=25^{\circ}\text{C}$, 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	30			V
Zero Gate Voltage Drain Current	I _{DSS}	V _{DS} =30V, V _{GS} =0V			1	μA
Gate-Source Leakage Current	I _{GSS}	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 (Pulsed)	R _{DS(ON)}	V _{GS} =10V, I _D =5.6A			23	mΩ
		V _{GS} =4.5V, I _D =5.0A			37	mΩ
DYNAMIC PARAMETERS						
Input Capacitance	C _{ISS}	V _{DS} =15V, V _{GS} =0V, f=1.0MHz		471		pF
Output Capacitance	C _{OSS}			129		pF
Reverse Transfer Capacitance	C _{RSS}			110		pF
SWITCHING PARAMETERS						
Total Gate Charge (Pulsed)	Q _G	V _{DS} =24V, V _{GS} =10V, I _D =5.0A, (Note 1, 2)		19		nC
Gate to Source Charge (Pulsed)	Q _{GS}			2		nC
Gate to Drain Charge (Pulsed)	Q _{GD}			6		nC
Turn-ON Delay Time (Pulsed)	t _{D(ON)}	V _{DD} =15V, V _{GS} =10V, I _D =5.0A, R _G =3Ω (Note 1, 2)		6		ns
Rise Time (Pulsed)	t _R			14		ns
Turn-OFF Delay Time (Pulsed)	t _{D(OFF)}			17		ns
Fall-Time (Pulsed)	t _F			21		ns
SOURCE TO DRAIN DIODE SPECIFICATIONS						
Maximum Body-Diode Continuous Current	I _S				5	A
Maximum Body-Diode Pulsed Current	I _{SM}				10	A
Drain-Source Diode Forward Voltage (Note 1)	V _{SD}	I _S =5.6A, V _{GS} =0V			1.4	V
Reverse Recovery Time (Note 1)	t _{rr}	I _S =5.0A, V _{GS} =0V, dI/dt=100A/μs		108		nS
Reverse Recovery Charge	Q _{rr}			102		nC

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

2. Essentially independent of operating temperature.

■ ELECTRICAL CHARACTERISTICS (Cont.)

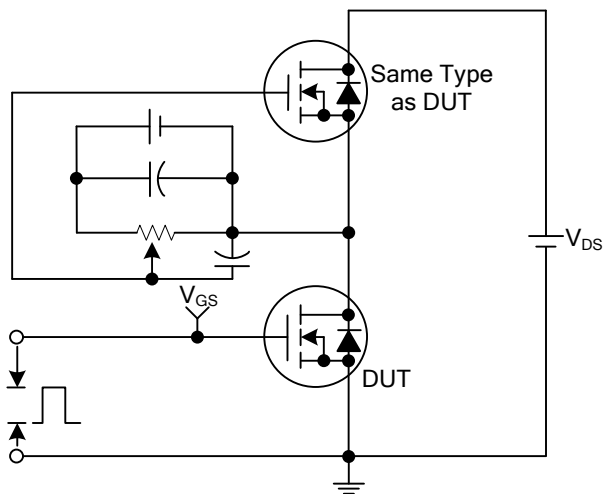
P-CHANNEL

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
OFF CHARACTERISTICS						
Drain-Source Breakdown Voltage	BV _{DSS}	I _D =-250μA, V _{GS} =0V	-30			V
Zero Gate Voltage Drain Current	I _{DSS}	V _{DS} =-30V, V _{GS} =0V			-1	μA
Gate-Source Leakage Current	I _{GSS}	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 (Pulsed)	R _{DS(ON)}	V _{GS} =-10V, I _D =-3.0A			47	mΩ
		V _{GS} =-4.5V, I _D =-2.0A			84	mΩ
DYNAMIC PARAMETERS						
Input Capacitance	C _{ISS}	V _{DS} =-15V, V _{GS} =0V, f=1.0MHz		563		pF
Output Capacitance	C _{OSS}			154		pF
Reverse Transfer Capacitance	C _{RSS}			124		pF
SWITCHING PARAMETERS						
Total Gate Charge (Pulsed)	Q _G	V _{DD} =-24V, V _{GS} =-10V, I _D =-5.0A (Note 1, 2)		17		nC
Gate to Source Charge (Pulsed)	Q _{GS}			2		nC
Gate to Drain Charge (Pulsed)	Q _{GD}			6		nC
Turn-ON Delay Time (Pulsed)	t _{D(ON)}	V _{DD} =-15V, V _{GS} =-10V, I _D =-5.0A, R _G =3Ω (Note 1, 2)		5		ns
Rise Time (Pulsed)	t _R			16		ns
Turn-OFF Delay Time (Pulsed)	t _{D(OFF)}			14		ns
Fall-Time (Pulsed)	t _F			22		ns
SOURCE TO DRAIN DIODE SPECIFICATIONS						
Maximum Body-Diode Continuous Current	I _S				-5	A
Maximum Body-Diode Pulsed Current	I _{SM}				-10	A
Drain-Source Diode Forward Voltage (Note 1)	V _{SD}	I _S =-5.6A, V _{GS} =0V			-1.4	V
Reverse Recovery Time (Note 1)	t _{rr}	I _S =5.0A, V _{GS} =0V, dI/dt=100A/μs		172		nS
Reverse Recovery Charge	Q _{rr}			314		nC

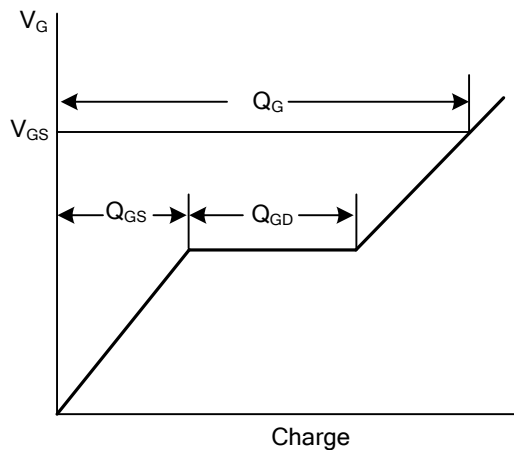
Notes: 1. Pulse Test: Pulse width $\leq 300\mu s$, Duty cycle $\leq 2\%$.
2. Essentially independent of operating temperature.

■ TEST CIRCUITS AND WAVEFORMS

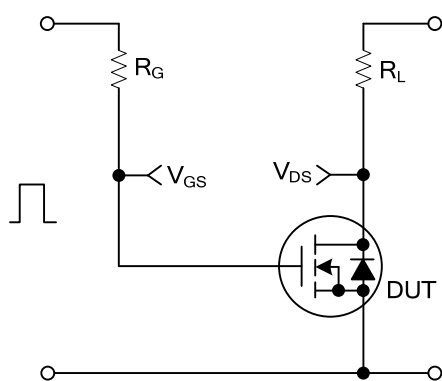
N-CHANNEL



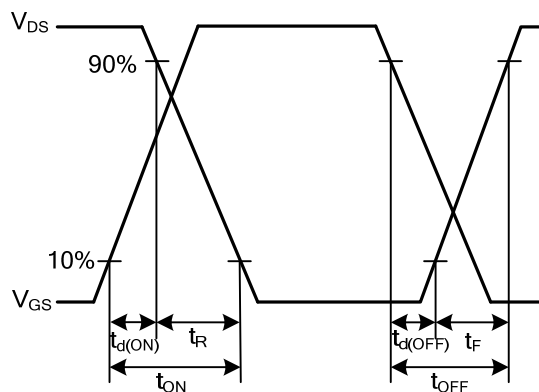
Gate Charge Test Circuit



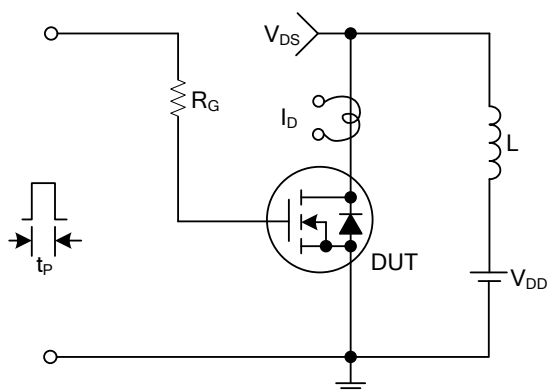
Gate Charge Waveforms



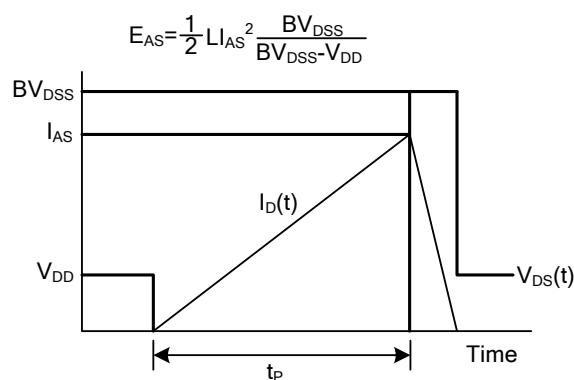
Resistive Switching Test Circuit



Resistive Switching Waveforms



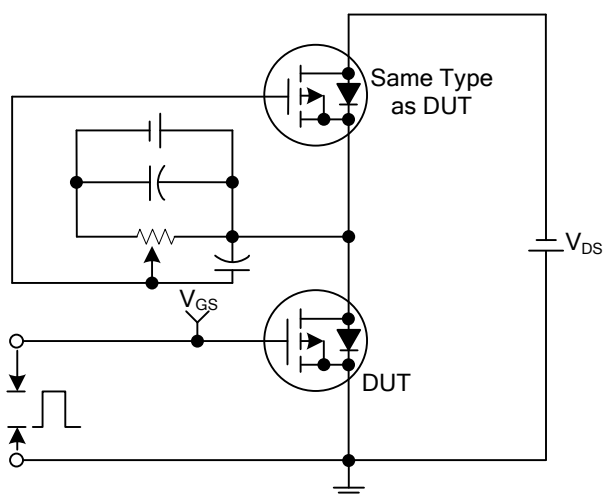
Unclamped Inductive Switching Test Circuit



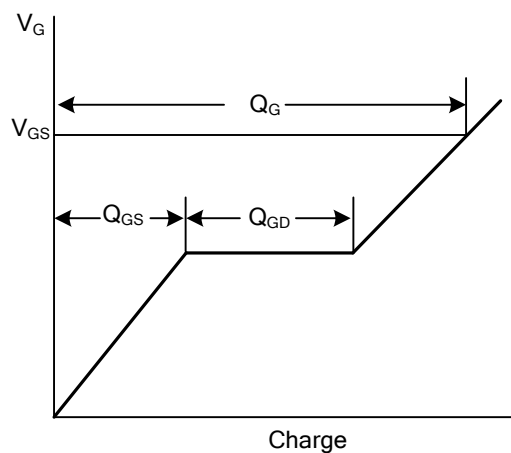
Unclamped Inductive Switching Waveforms

■ TEST CIRCUITS AND WAVEFORMS

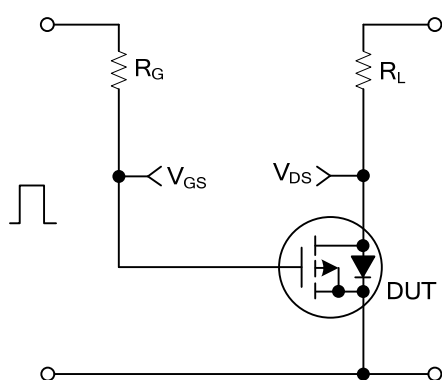
P-CHANNEL



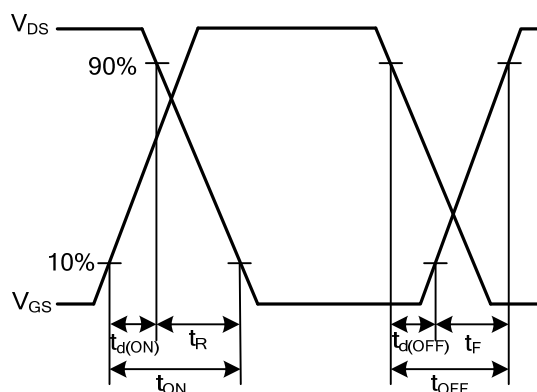
Gate Charge Test Circuit



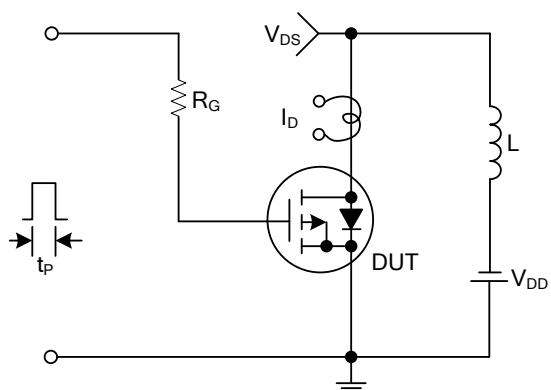
Gate Charge Waveforms



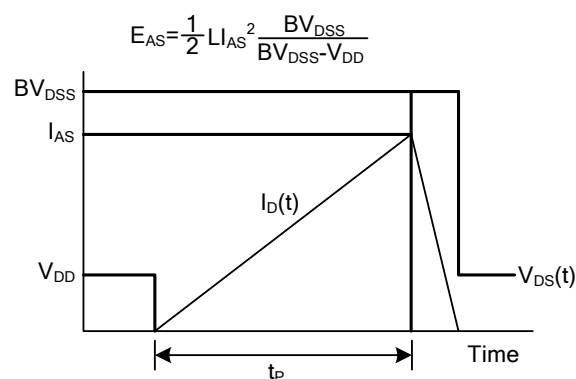
Resistive Switching Test Circuit



Resistive Switching Waveforms



Unclamped Inductive Switching Test Circuit



Unclamped Inductive Switching Waveforms

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