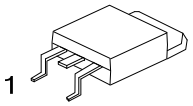
3.8A, 250V N-CHANNEL MOSFET



TO-252

■ DESCRIPTION

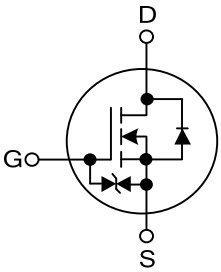
The UTC **5N25Z** is an N-Channel enhancement MOSFET, it uses UTC's advanced technology to provide customers with a minimum on-state resistance, high switching speed and low gate charge. It can also withstand high energy pulse in the avalanche and commutation modes.

The UTC **5N25Z** is suitable for high efficiency switching DC/DC converter, motor control and switch mode power supply.

■ FEATURES

* $R_{DS(ON)}$<1.2Ω @ V_{GS}=10V
* Low gate charge (Typ=14nC)
* Low C_{RSS} (Typ=6.0pF)
* High switching speed
* ESD Capability

■ SYMBOL



■ ORDERING INFORMATION

Ordering Number		Package	Pin Assignment			Packing
Lead Free	Halogen Free		1	2	3	
5N25ZL-TN3-T	5N25ZG-TN3-T	TO-252	G	D	S	Tube
5N25ZL-TN3-R	5N25ZG-TN3-R	TO-252	G	D	S	Tape Reel

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

5N25ZL-TN3-T (1)Packing Type (2)Package Type (3)Lead Free	(1) T: Tube, R: Tape Reel (2) TN3: TO-252 (3) L: Lead Free, G: Halogen Free

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

PARAMETER SYMBOL			RATINGS	UNIT
Drain-Source Voltage		V_{DSS} 250		V
Gate-Source Voltage		V_{GSS} ±20		V
Drain Current	Continuous I	$_D$ 3.8		A
	Pulsed (Note 2)	I_{DM} 9		A
Avalanche Current (Note 2)		I_{AR} 3.8		A
Avalanche Energy	Single Pulsed (Note 3)	E_{AS} 60		mJ
	Repetitive (Note 2)	E_{AR}	3.7	mJ
Peak Diode Recovery dv/dt (Note 4)		dv/dt	5.5	V/ns
Power Dissipation	T_A=25°C	P_D	2.5 W	
	T_C=25°C 37			W
	Derate above 25°C		0.29	W/°C
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. Repetitive Rating: Pulse width limited by maximum junction temperature.
3. L=6.2mH, I_{AS}=3.8A, V_{DD}=50V, R_G=25Ω, Starting T_J=25°C.
4. I_{SD}≤4.5A, di/dt≤300A/μs, V_{DD}≤BV_{DSS}, Starting T_J=25°C.

■ THERMAL CHARACTERISTICS

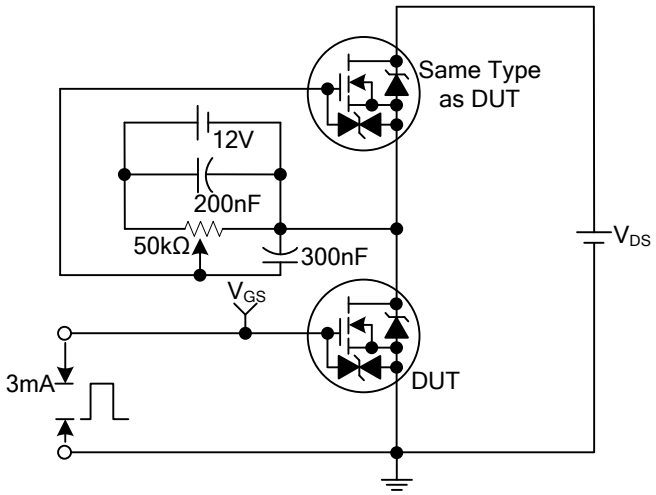
PARAMETER SYMBOL		RATINGS	UNIT
Junction to Ambient	θ_{JA}	110	°C/W
Junction to Case	θ_{JC}	3.4	°C/W

■ ELECTRICAL CHARACTERISTICS (T_C=25°C, unless otherwise noted)

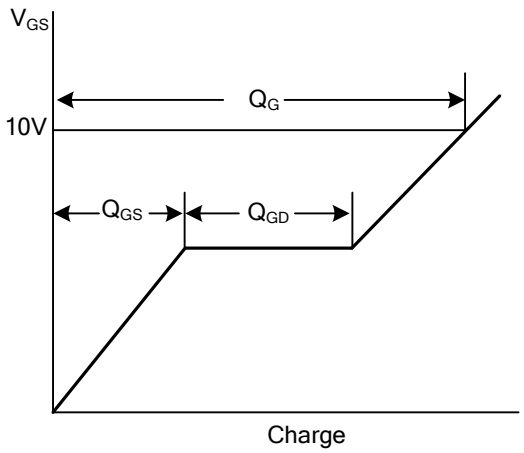
PARAMETER		SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
OFF CHARACTERISTICS							
Drain-Source Breakdown Voltage		BV_{DSS}	I_D=250μA, V_{GS}=0V 250				V
Breakdown Voltag e T emperature Coefficient		$\triangle BV_{DSS}/\triangle T_J$	Reference to 25°C, I_D=250μA		0.18		V/°C
Drain-Source Leakage Current		I_{DSS}	V_{DS}=250V, V_{GS}=0V			1	μA
Gate-Source Leakage Current	Forward	I_{GSS}	V_{GS}=+20V, V_{DS}=0V			+10	μA
	Reverse V		$_{GS}$=-20V, V_{DS}=0V			-10	μA
ON CHARACTERISTICS							
Gate Threshold Voltage		$V_{GS(TH)}$	V_{DS}=V_{GS}, I_D=250μA 2			4	V
Static Drain-S ource On-Stat e Resistanc e (Note 1)		$R_{DS(ON)}$	V_{GS}=10V, I_D=1.9A		0.78	1.2	Ω
			V_{GS}=5V, I_D=1.9A		0.92	1.25	Ω
Forward Transconductance		g_{FS}	V_{DS}=30V, I_D=1.9A		3.35		S
DYNAMIC PARAMETERS							
Input Capacitance		C_{ISS}	V_{GS}=0V, V_{DS}=25V, f=1.0MHz	250		325	pF
Output Capacitance		C_{OSS}			40	50	pF
Reverse Transfer Capacitance		C_{RSS}			6	8	pF
SWITCHING PARAMETERS							
Total Gate Charge		Q_G	V_{GS}=10V, V_{DS}=30V, I_D=1.3A, I_G=100μA (Note 1, 2)	14		20	nC
Gate to Source Charge		Q_{GS}			4		nC
Gate to Drain Charge		Q_{GD}			2.7		nC
Turn-ON Delay Time		$t_{D(ON)}$	V_{DD}=30V, I_D=0.5A, R_G=25Ω, V_{GS}=10V (Note 1, 2)	30		35	ns
Rise Time		t_R			26	40	ns
Turn-OFF Delay Time		$t_{D(OFF)}$			90	110	ns
Fall-Time		t_F			27	40	ns
SOURCE- DRAIN DIODE RATINGS AND CHARACTERISTICS							
Maximum Body-Diode Continuous Current		I_S				3.8	A
Maximum Body-Diode Pulsed Current		I_{SM}				9	A
Drain-Source Diode Forward Voltage		V_{SD}	I_S=3.8A, V_{GS}=0V			1.5	V
Body Diode Reverse Recovery Time		t_{RR}	I_S=4.5A, V_{GS}=0V, dI_F/dt=100A/μs (Note 1)	95			ns
Body Diode Reverse Recovery Charge		Q_{RR}			0.3		μC

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

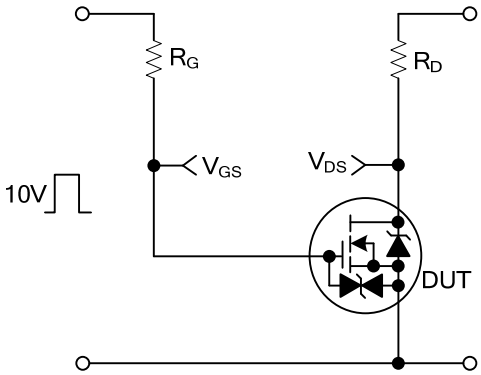
■ TEST CIRCUITS AND WAVEFORMS



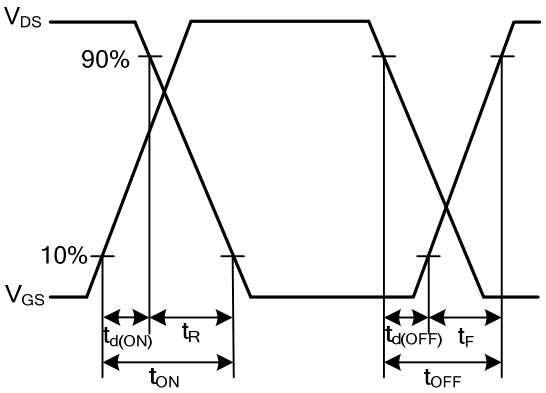
Gate Charge Test Circuit



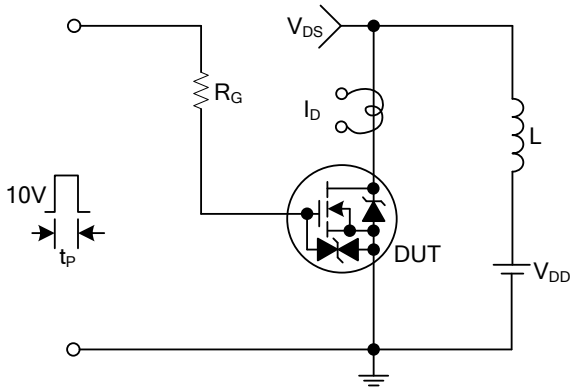
Gate Charge Waveforms



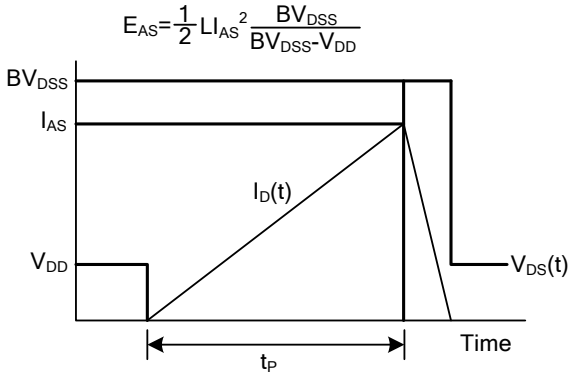
Resistive Switching Test Circuit



Resistive Switching Waveforms

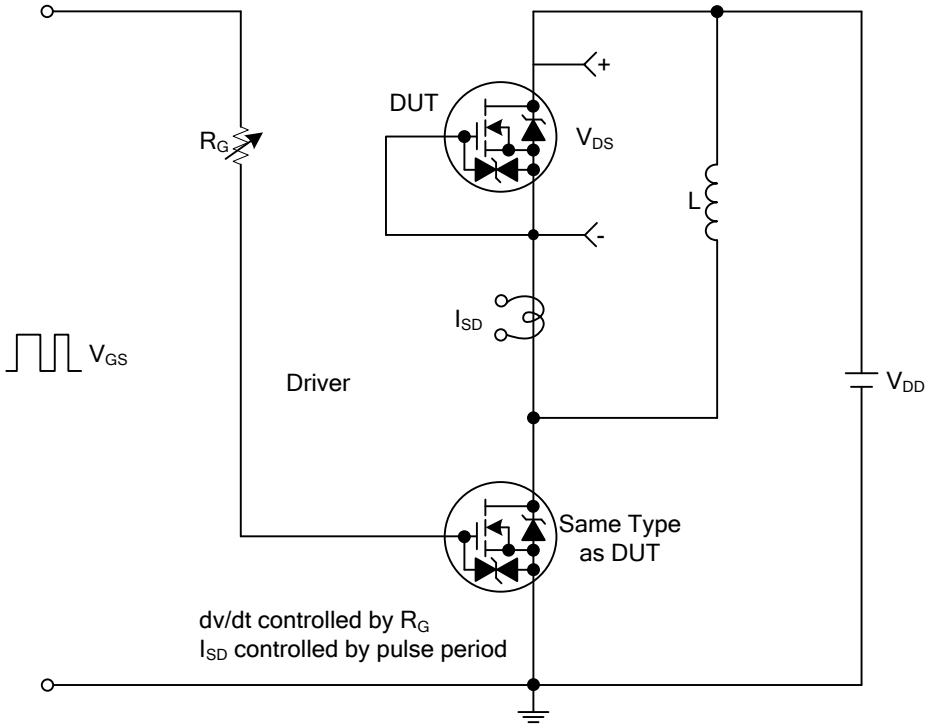


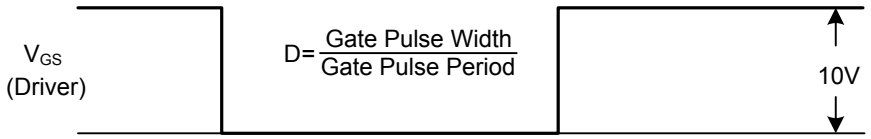
Unclamped Inductive Switching Test Circuit

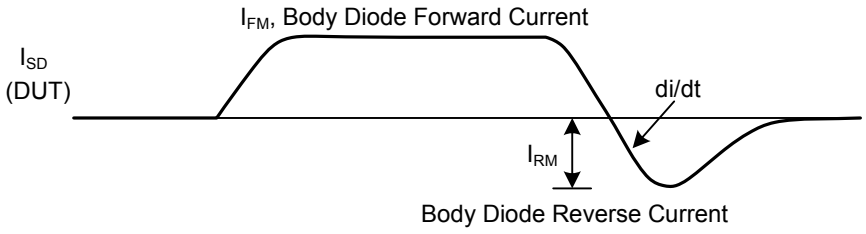


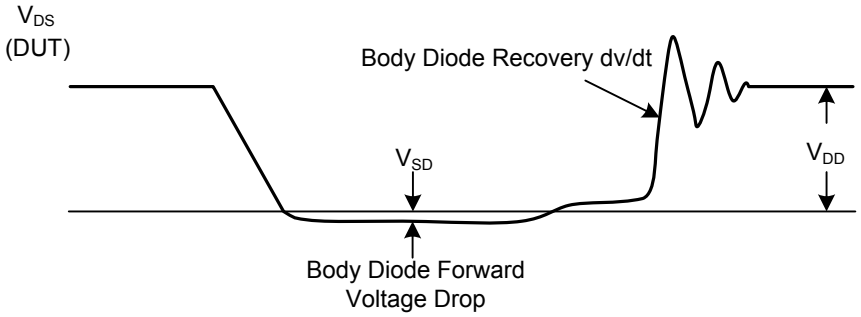
Unclamped Inductive Switching Waveforms

■ TEST CIRCUITS AND WAVEFORMS(Cont.)









Peak Diode Recovery dv/dt Test Circuit and Waveforms