



# 05N30

**Power MOSFET**

## 0.5A, 300V N-CHANNEL POWER MOSFET

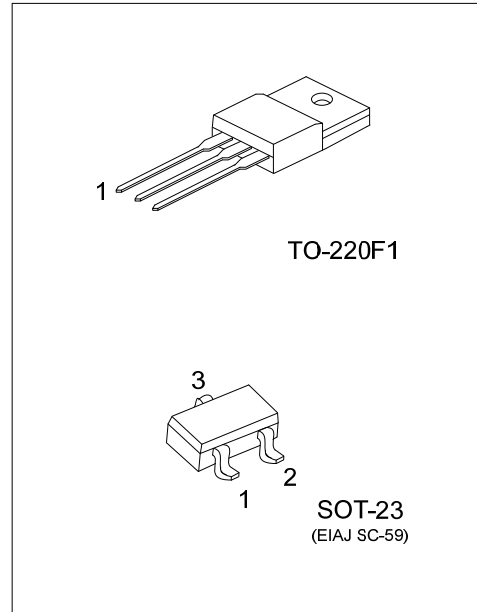
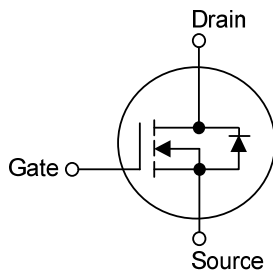
■ DESCRIPTION

The UTC **05N30** is a N-channel mode power MOSFET using UTC's advanced technology to provide customers with a minimum on-state resistance, low gate charge and superior switching performance.

■ FEATURES

- \*  $R_{DS(ON)} \leq 5.0 \Omega @ V_{GS}=10V, I_D=0.25A$
- \* High switching speed
- \* 100% avalanche tested

■ SYMBOL



■ ORDERING INFORMATION

Ordering Number		Package	Pin Assignment			Packing
Lead Free	Halogen Free		1	2	3	
05N30L-AE3-R	05N30G-AE3-R	SOT-23	G	S	D	Tape Reel
05N30L-TF1-T	05N30G-TF1-T	TO-220F1	G	D	S	Tube

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

<p>05N30G-AE3-R</p> <ul style="list-style-type: none"> <li>(1) Packing Type</li> <li>(2) Package Type</li> <li>(3) Green Package</li> </ul>	<ul style="list-style-type: none"> <li>(1) R: Tape Reel, T: Tube</li> <li>(2) AE3: SOT-23, TF1: TO-220F1</li> <li>(3) G: Halogen Free and Lead Free, L: Lead Free</li> </ul>
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■ MARKING

SOT-23	TO-220F1

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

PARAMETER		SYMBOL	RATINGS	UNIT
Drain-Source Voltage		$V_{DSS}$	300	V
Gate-Source Voltage		$V_{GSS}$	$\pm 30$	V
Continuous Drain Current		$I_D$	0.5	A
Pulsed Drain Current (Note 2)		$I_{DM}$	2.0	A
Power Dissipation	SOT-23	$P_D$	0.6	W
	TO-220F1		15	W
Junction Temperature		$T_J$	+150	$^\circ\text{C}$
Storage Temperature		$T_{STG}$	-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.

■ THERMAL DATA

PARAMETER		SYMBOL	RATINGS	UNIT
Junction to Ambient	SOT-23	$\theta_{JA}$	325	$^\circ\text{C/W}$
	TO-220F1		625	$^\circ\text{C/W}$
Junction to Case	SOT-23	$\theta_{JC}$	208	$^\circ\text{C/W}$
	TO-220F1		8.33	$^\circ\text{C/W}$

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

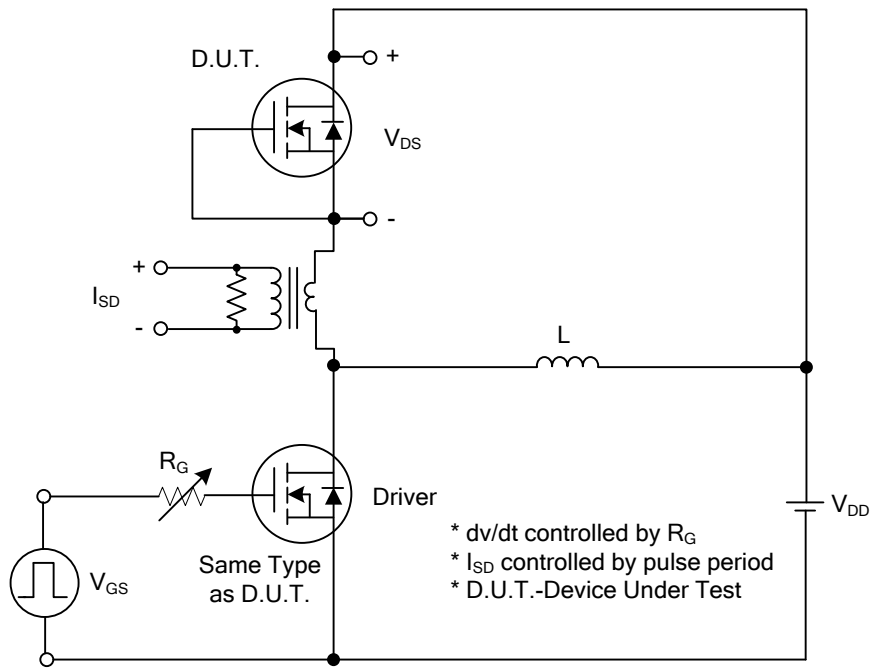
■ ELECTRICAL CHARACTERISTICS ( $T_J=25^\circ\text{C}$ , unless otherwise specified)

PARAMETER		SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT	
<b>OFF CHARACTERISTICS</b>								
Drain-Source Breakdown Voltage		$BV_{DSS}$	$I_D=250\mu\text{A}$ , $V_{DS}=0\text{V}$	300			V	
Drain-Source Leakage Current		$I_{DSS}$	$V_{DS}=300\text{V}$			10	$\mu\text{A}$	
Gate-Source Leakage Current	Forward	$I_{GSS}$	$V_{GS}=+30\text{V}$ , $V_{DS}=0\text{V}$			100	nA	
	Reverse		$V_{GS}=-30\text{V}$ , $V_{DS}=0\text{V}$			-100	nA	
<b>ON CHARACTERISTICS</b>								
Gate Threshold Voltage		$V_{GS(TH)}$	$I_D=250\mu\text{A}$	1.0		3.0	V	
Static Drain-Source On-State Resistance		$R_{DS(ON)}$	$V_{GS}=10\text{V}$ , $I_D=0.25\text{A}$			5.0	$\Omega$	
<b>DYNAMIC PARAMETERS</b>								
Input Capacitance		$C_{ISS}$	$V_{GS}=0\text{V}$ , $V_{DS}=25\text{V}$ , $f=1\text{MHz}$		100		pF	
Output Capacitance		$C_{OSS}$				20		pF
Reverse Transfer Capacitance		$C_{RSS}$				3.2		pF
<b>SWITCHING PARAMETERS</b>								
Total Gate Charge (Note 1)		$Q_G$	$V_{DS}=240\text{V}$ , $V_{GS}=10\text{V}$ , $I_D=0.5\text{A}$ $I_G=1\text{mA}$ (Note1, 2)		8.5		nC	
Gate to Source Charge		$Q_{GS}$				2.2		nC
Gate to Drain Charge		$Q_{GD}$				1.2		nC
Turn-ON Delay Time (Note 1)		$t_{D(ON)}$	$V_{DS}=150\text{V}$ , $V_{GS}=10\text{V}$ , $I_D=0.5\text{A}$ , $R_G=25\Omega$ (Note1, 2)		4		ns	
Rise Time		$t_R$				17		ns
Turn-OFF Delay Time		$t_{D(OFF)}$				9		ns
Fall-Time		$t_F$				20		ns
<b>SOURCE- DRAIN DIODE RATINGS AND CHARACTERISTICS</b>								
Maximum Body-Diode Continuous Current		$I_S$				0.5	A	
Maximum Body-Diode Pulsed Current		$I_{SM}$				2.0	A	
Drain-Source Diode Forward Voltage (Note 1)		$V_{SD}$	$I_S=0.5\text{A}$ , $V_{GS}=0\text{V}$			1.4	V	
Reverse Recovery Time (Note 1)		$t_{rr}$	$I_S=0.5\text{A}$ , $V_{GS}=0\text{V}$			65	ns	
Reverse Recovery Charge		$Q_{rr}$	$di/dt=100\text{A}/\mu\text{s}$			75	$\mu\text{C}$	

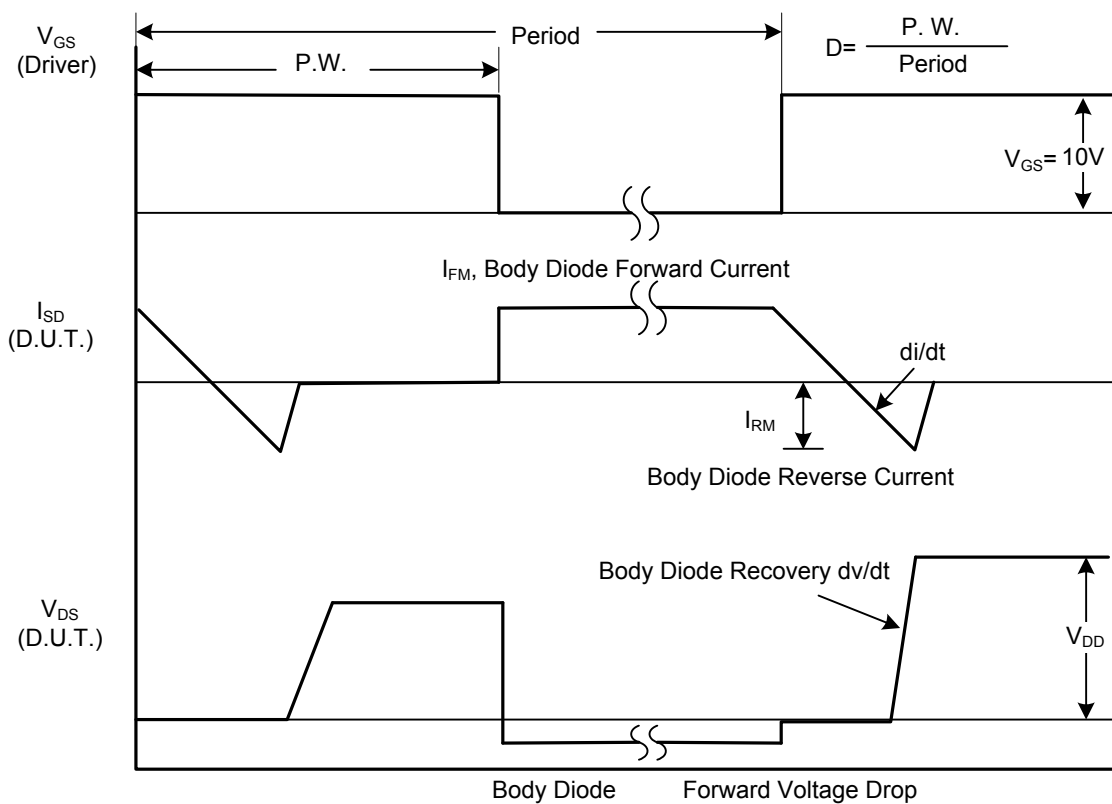
Notes: 1. Pulse Test : Pulse width  $\leq 300\mu\text{s}$ , Duty cycle  $\leq 2\%$ .

2. Essentially independent of operating temperature.

■ TEST CIRCUITS AND WAVEFORMS

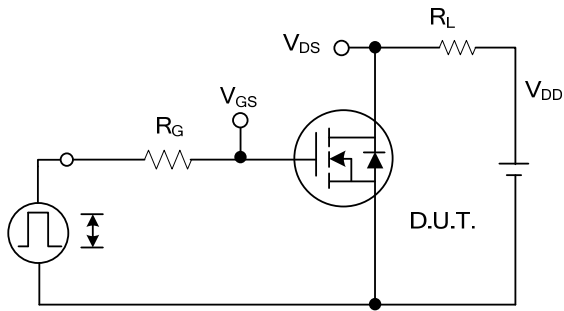


Peak Diode Recovery dv/dt Test Circuit

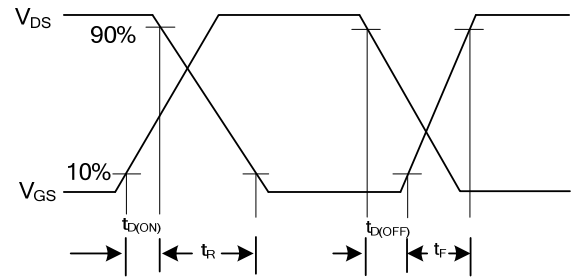


Peak Diode Recovery dv/dt Waveforms

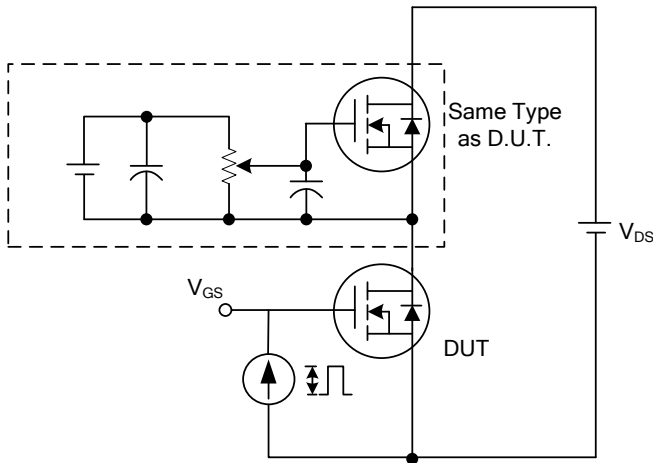
■ TEST CIRCUITS AND WAVEFORMS



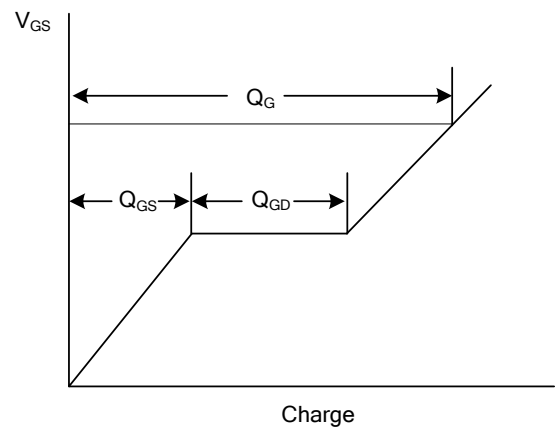
Switching Test Circuit



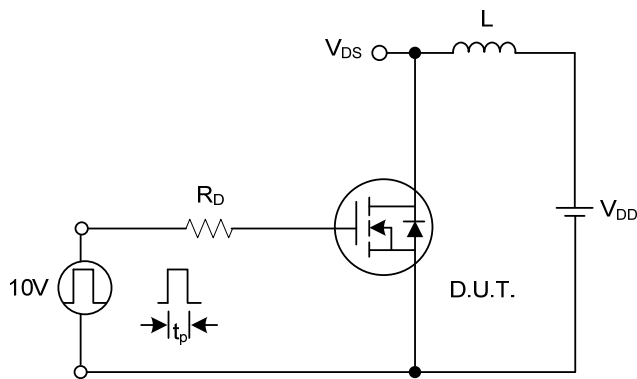
Switching Waveforms



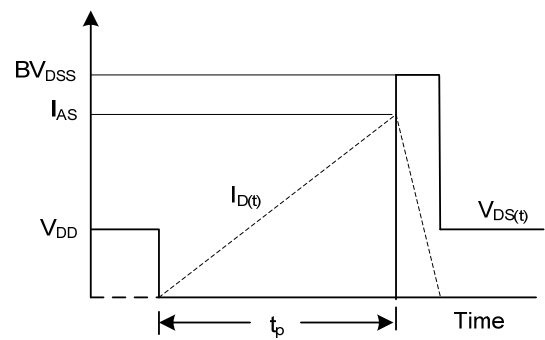
Gate Charge Test Circuit



Gate Charge Waveform

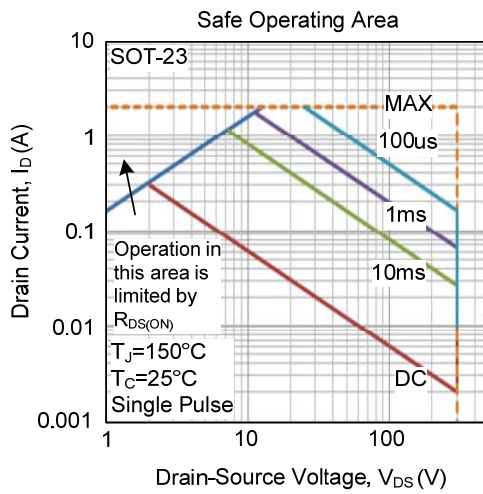


Unclamped Inductive Switching Test Circuit



Unclamped Inductive Switching Waveforms

## ■ TYPICAL CHARACTERISTICS



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