



## 25N06

Preliminary

Power MOSFET

### 25A, 60V N-CHANNEL POWER MOSFET

#### DESCRIPTION

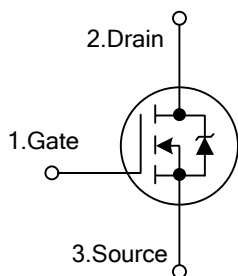
The UTC **25N06** is an N-channel enhancement mode power MOSFET, which provides low gate charge, avalanche rugged technology, and so on.

The UTC **25N06** is universally applied in DC-DC & DC-AC converters, motor control, high current, high speed switching, solenoid and relay drivers, regulators, audio amplifiers, automotive environment.

#### FEATURES

- \* Low Gate Charge
- \*  $R_{DS(on)} = 0.048 \Omega$  (TYP.)
- \* Avalanche Rugged Technology
- \* 100% Avalanche Tested
- \* Repetitive Avalanche at 100°C
- \* High Current Capability
- \* Operating Temperature: 150°C
- \* Application Oriented Characterization

#### SYMBOL

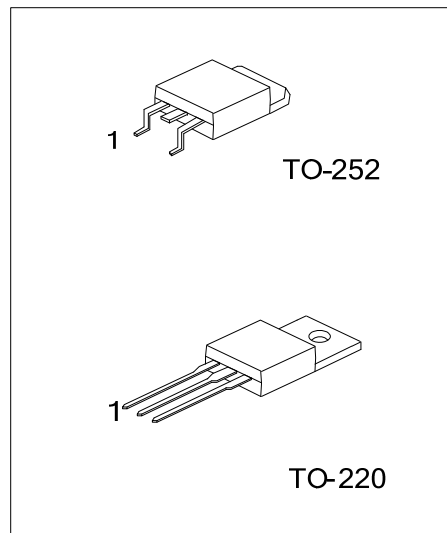


#### ORDERING INFORMATION

Ordering Number		Package	Pin Assignment			Packing
Lead Free	Halogen Free		1	2	3	
25N06L-TA3-T	25N06G-TA3-T	TO-220	G	D	S	Tube
25N06L-TN3-T	25N06G-TN3-T	TO-252	G	D	S	Tube
25N06L-TN3-R	25N06G-TN3-R	TO-252	G	D	S	Tape Reel

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

<p>25N06L-TA3-T</p> <p>(1)Packing Type</p> <p>(2)Package Type</p> <p>(3)Lead Free</p>	<p>(1) T: Tube, R: Tape Reel</p> <p>(2) TA3: TO-220, TN3: TO-252</p> <p>(3) G: Halogen Free, L: Lead Free</p>
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### ■ ABSOLUTE MAXIMUM RATINGS

PARAMETER		SYMBOL	RATINGS	UNIT
Drain-Source Voltage ( $V_{GS}=0$ )		$V_{DS}$	60	V
Drain-Gate Voltage ( $R_{GS}=20k\Omega$ )		$V_{DGR}$	60	V
Gate-Source Voltage		$V_{GS}$	$\pm 20$	V
Drain Current (Continuous)	$T_C=25^\circ\text{C}$	$I_D$	25	A
	$T_C=100^\circ\text{C}$		17	A
Drain Current (Pulsed) (Note 2)		$I_{DM}$	100	A
Single Pulse Avalanche Energy (starting $T_J=25^\circ\text{C}$ , $I_D=25\text{A}$ , $V_{DD}=25\text{V}$ )		$E_{AS}$	100	mJ
Power Dissipation at $T_C=25^\circ\text{C}$	TO-220	$P_D$	90	W
	TO-252		41	
Junction Temperature		$T_J$	150	$^\circ\text{C}$
Storage Temperature		$T_{STG}$	-65 ~ +150	$^\circ\text{C}$

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. Pulse width limited by safe operating area

### ■ THERMAL DATA

PARAMETER		SYMBOL	RATINGS	UNIT
Junction to Ambient	TO-220	$\theta_{JA}$	62.5	$^\circ\text{C/W}$
	TO-252		100	
Junction to Case	TO-220	$\theta_{JC}$	1.57	$^\circ\text{C/W}$
	TO-252		3	

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

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
<b>OFF CHARACTERISTICS</b>						
Drain-Source Breakdown Voltage	$BV_{DSS}$	$I_D = 250\mu\text{A}$ , $V_{GS} = 0\text{V}$	60			V
Drain-Source Leakage Current ( $V_{GS} = 0$ )	$I_{DSS}$	$V_{DS} = \text{Max Rating}$			1	$\mu\text{A}$
		$V_{DS} = \text{Max Rating} \times 0.8$ , $T_C = 125^\circ\text{C}$			10	
Gate- Source Leakage Current ( $V_{DS} = 0$ )	$I_{GSS}$	$V_{GS} = \pm 20\text{V}$			$\pm 100$	nA
<b>ON CHARACTERISTICS</b>						
Gate Threshold Voltage	$V_{GS(TH)}$	$V_{DS} = V_{GS}$ , $I_D = 250\mu\text{A}$	2	2.9	4	V
Static Drain-Source On-State Resistance	$R_{DS(ON)}$	$V_{GS} = 10\text{V}$ , $I_D = 12.5\text{A}$		0.048	0.065	$\Omega$
On State Drain Current	$I_{D(on)}$	$V_{DS} > I_{D(on)} \times R_{DS(ON)MAX}$ , $V_{GS} = 10\text{V}$	25			A
Forward Transconductance (Note 1)	$g_{FS}$	$V_{DS} > I_{D(on)} \times R_{DS(ON)MAX}$ , $I_D = 12.5\text{A}$	7	11		S
<b>DYNAMIC PARAMETERS</b>						
Input Capacitance	$C_{ISS}$	$V_{GS} = 0\text{V}$ , $V_{DS} = 25\text{V}$ , $f = 1\text{MHz}$		700	900	pF
Output Capacitance	$C_{OSS}$			320	450	pF
Reverse Transfer Capacitance	$C_{RSS}$			90	150	pF
<b>SWITCHING PARAMETERS</b>						
Total Gate Charge	$Q_G$	$V_{DD} = 40\text{V}$ , $V_{GS} = 10\text{V}$ , $I_D = 25\text{A}$		26	40	nC
Gate to Source Charge	$Q_{GS}$			8		nC
Gate to Drain Charge	$Q_{GD}$			9		nC
Turn-ON Delay Time	$t_{D(ON)}$	$V_{DD} = 30\text{V}$ , $I_D = 3\text{A}$ , $R_G = 50\Omega$ , $V_{GS} = 10\text{V}$		30	45	ns
Rise Time	$t_R$			90	130	ns
Turn-OFF Delay Time	$t_{D(OFF)}$	$V_{DD} = 40\text{V}$ , $I_D = 25\text{A}$ , $R_G = 50\Omega$ , $V_{GS} = 10\text{V}$		80	120	ns
Fall-Time	$t_F$			80	120	ns
<b>SOURCE- DRAIN DIODE RATINGS AND CHARACTERISTICS</b>						
Drain-Source Diode Forward Voltage	$V_{SD}$	$I_{SD} = 25\text{A}$ , $V_{GS} = 0\text{V}$ (Note 1)			1.5	V
Source-Drain Current	$I_{SD}$				25	A
Source-Drain Current (Pulsed) (Note 2)	$I_{SDM}$				100	A

Note: 1. Pulsed: Pulse duration = 300 $\mu\text{s}$ , duty cycle 1.5%.

2. Pulse width limited by safe operating area

SWITCHING TIME TEST CIRCUIT

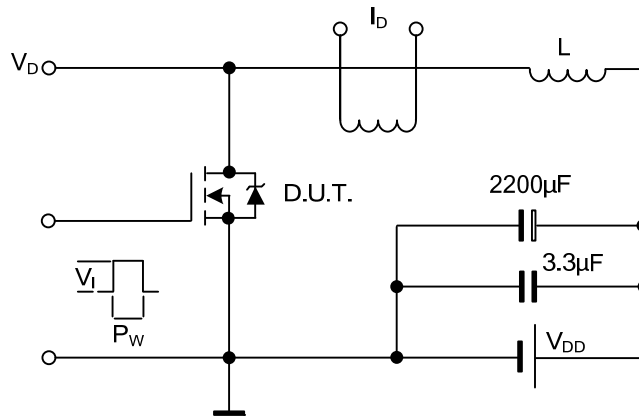


Fig. 1 Unclamped Inductive Load Test Circuits

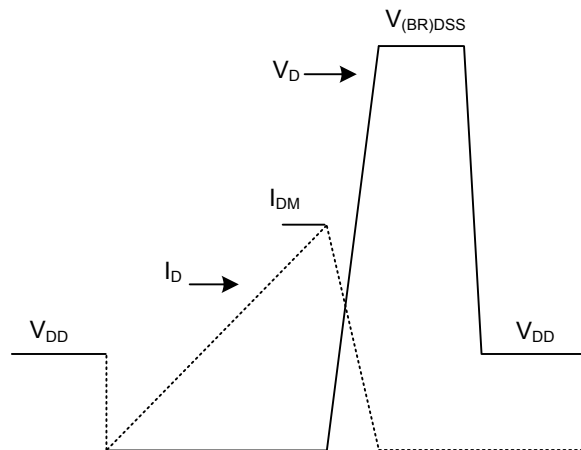


Fig. 2 Unclamped Inductive Waveforms

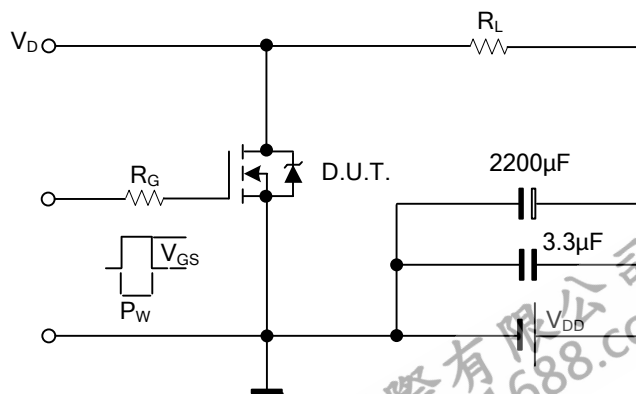


Fig. 3. Switching Times Test Circuits For Resistive Load

SWITCHING TIME TEST CIRCUIT (Cont.)

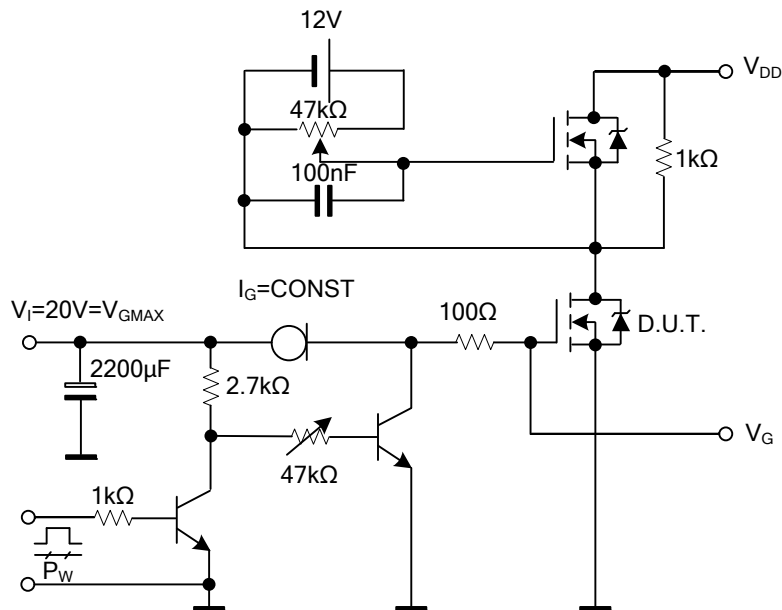


Fig. 4 Gate Charge Test Circuit

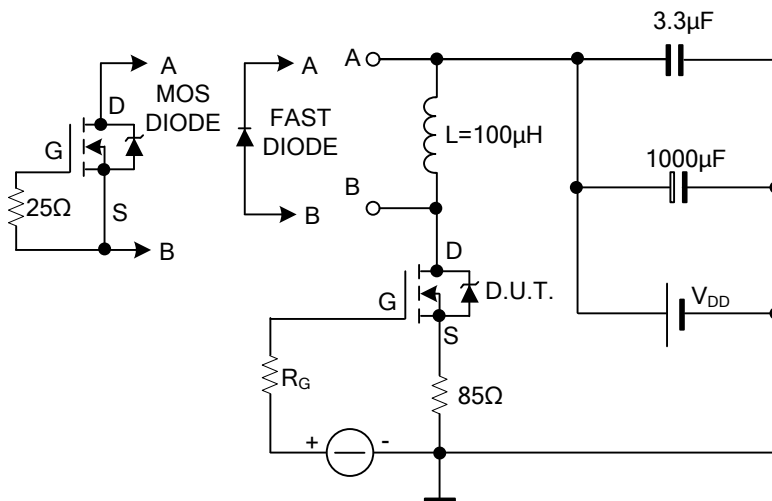


Fig. 5 Test Circuit For Inductive Load Switching And Diode Reverse Recovery Time

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