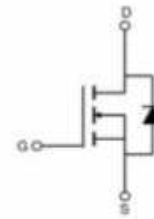


# AP3004S

## N-Channel Enhancement Mosfet

### Feature

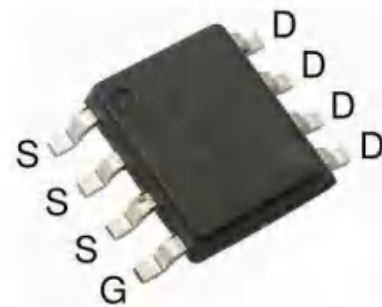
- 30V,20A  
 $R_{DS(on)} < 6m\ \Omega @ V_{GS}=10V$   
 $R_{DS(on)} < 9m\ \Omega @ V_{GS}=4.5V$
- Advanced Trench Technology
- Lead free product is acquired
- Excellent  $R_{DS(on)}$  and Low Gate Charge



Schematic Diagram

### Application

- PWM applications
- Load Switch
- Power management



SOP-8

### Package Marking and Ordering Information

Device Marking	Device	Device Package	Reel Size	Tape width	Quantity (PCS)
3004S	AP3004S	SOP-8	13 inch	-	4000

### ABSOLUTE MAXIMUM RATINGS ( $T_a=25^\circ\text{C}$ unless otherwise noted)

Parameter	Symbol	Value	Unit
Drain-Source Voltage	$V_{DS}$	30	V
Gate-Source Voltage	$V_{GS}$	$\pm 20$	V
Continuous Drain Current ( $T_a = 25^\circ\text{C}$ )	$I_D$	20	A
Continuous Drain Current ( $T_a = 100^\circ\text{C}$ )	$I_D$	14	A
Pulsed Drain Current <sup>(1)</sup>	$I_{DM}$	52	A
Singel Pulsed Avalanche Energy <sup>(2)</sup>	$E_{AS}$	64.8	mJ
Power Dissipation	$P_D$	3	W
Thermal Resistance from Junction to Ambient <sup>(4)</sup>	$R_{\theta JA}$	42	$^\circ\text{C}/\text{W}$
Junction Temperature	$T_J$	150	$^\circ\text{C}$
Storage Temperature	$T_{STG}$	-55~ +150	$^\circ\text{C}$

**MOSFET ELECTRICAL CHARACTERISTICS**( $T_a=25^\circ\text{C}$  unless otherwise noted)

Parameter	Symbol	Test Condition	Min	Type	Max	Unit
<b>Static Characteristics</b>						
Drain-source breakdown voltage	$V_{(BR)DSS}$	$V_{GS} = 0V, I_D = 250\mu A$	30	-	-	V
Zero gate voltage drain current	$I_{DSS}$	$V_{DS} = 30V, V_{GS} = 0V$	-	-	1	$\mu A$
Gate-body leakage current	$I_{GSS}$	$V_{GS} = \pm 20V, V_{DS} = 0V$	-	-	$\pm 100$	nA
Gate threshold voltage <sup>(3)</sup>	$V_{GS(th)}$	$V_{DS} = V_{GS}, I_D = 250\mu A$	1	1.5	2.5	V
Drain-source on-resistance <sup>(3)</sup>	$R_{DS(on)}$	$V_{GS} = 10V, I_D = 20A$	-	5.0	6.0	m $\Omega$
		$V_{GS} = 4.5V, I_D = 10A$	-	7.0	9.0	
<b>Dynamic characteristics</b>						
Input Capacitance	$C_{iss}$	$V_{DS} = 15V, V_{GS} = 0V, f = 1MHz$	-	1614	-	pF
Output Capacitance	$C_{oss}$		-	245	-	
Reverse Transfer Capacitance	$C_{rss}$		-	215	-	
<b>Switching characteristics</b>						
Turn-on delay time	$t_{d(on)}$	$V_{DD} = 15V, I_D = 20A,$ $V_{GS} = 10V, R_G = 3\Omega$	-	7.5	-	ns
Turn-on rise time	$t_r$		-	14.5	-	
Turn-off delay time	$t_{d(off)}$		-	35.2	-	
Turn-off fall time	$t_f$		-	9.6	-	
Total Gate Charge	$Q_g$	$V_{DS} = 15V, I_D = 20A,$ $V_{GS} = 10V$	-	33.7	-	nC
Gate-Source Charge	$Q_{gs}$		-	8.5	-	
Gate-Drain Charge	$Q_{gd}$		-	7.5	-	
<b>Source-Drain Diode characteristics</b>						
Diode Forward voltage <sup>(3)</sup>	$V_{DS}$	$V_{GS} = 0V, I_S = 1A$	-	-	1.2	V
Diode Forward current <sup>(4)</sup>	$I_S$		-	-	20	A

**Notes:**

1. Repetitive Rating: pulse width limited by maximum junction temperature
2. EAS Condition:  $T_J = 25^\circ\text{C}, V_{DD} = 15V, R_G = 25\Omega, L = 0.1mH, I_{AS} = 36A$
3. Pulse Test: pulse width  $\leq 300\mu s$ , duty cycle  $\leq 2\%$
4. Surface Mounted on FR4 Board,  $t \leq 10$  sec

**Test Circuit**

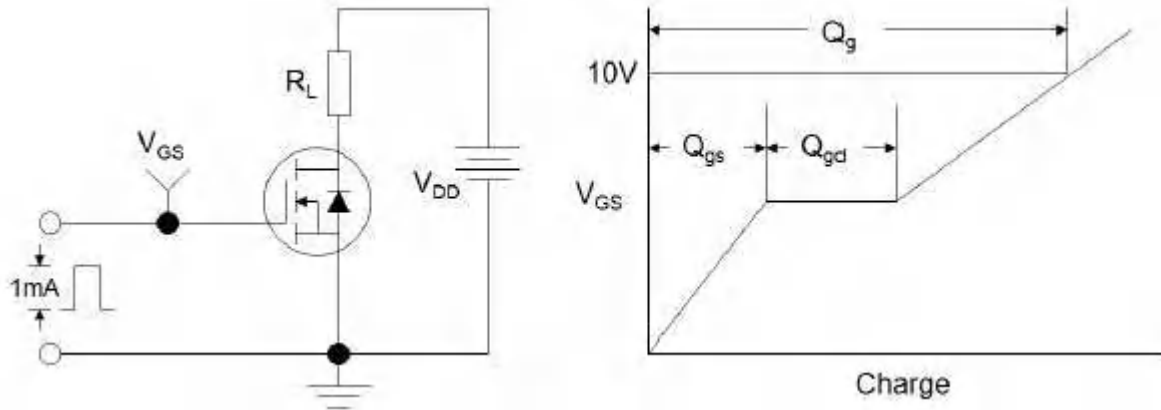


Figure1:Gate Charge Test Circuit & Waveform

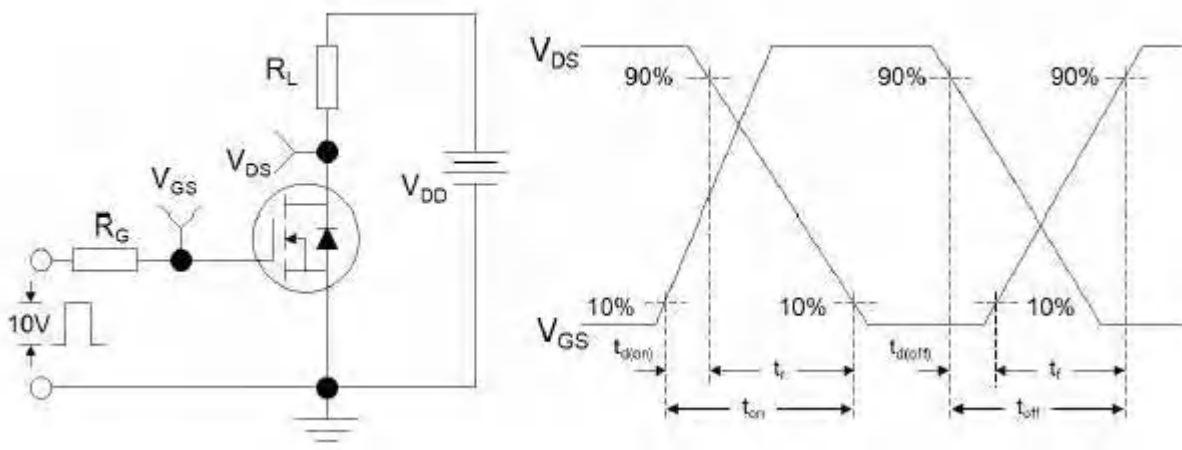


Figure 2: Resistive Switching Test Circuit & Waveforms

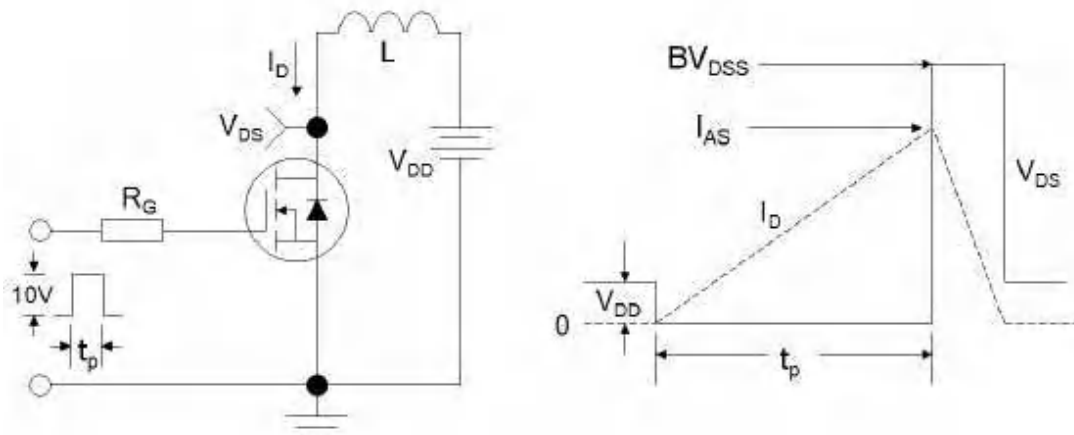
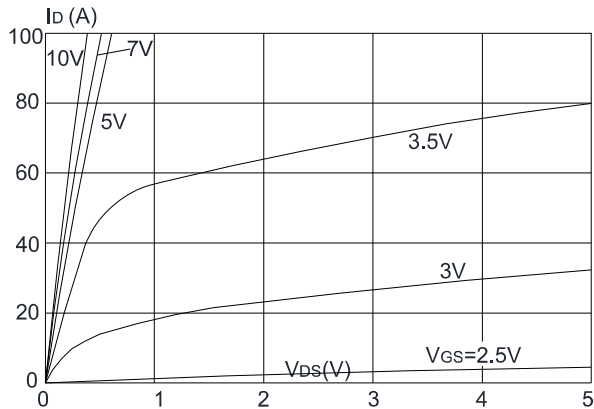


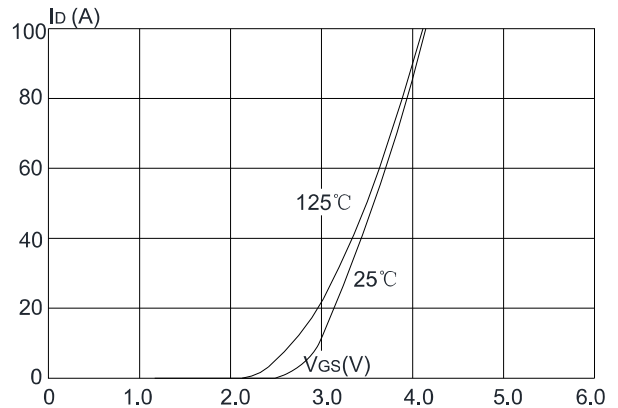
Figure 3:Unclamped Inductive Switching Test Circuit & Waveforms

**Typical Performance Characteristics**

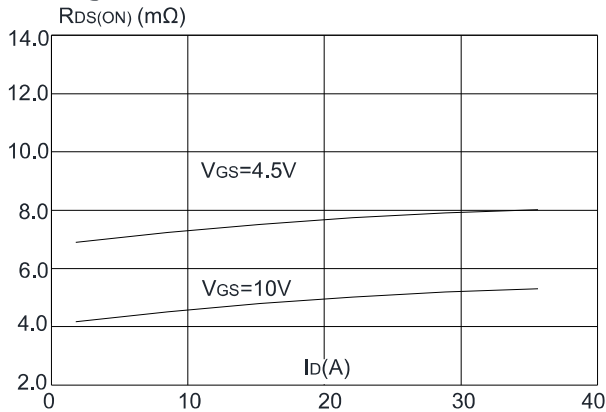
**Figure 1: Output Characteristics**



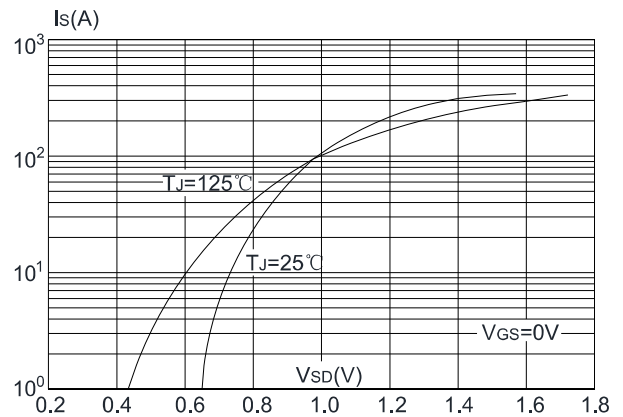
**Figure 2: Typical Transfer Characteristics**



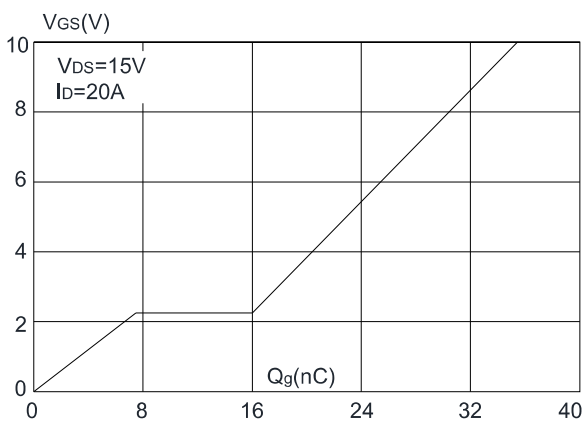
**Figure 3: On-resistance vs. Drain Current**



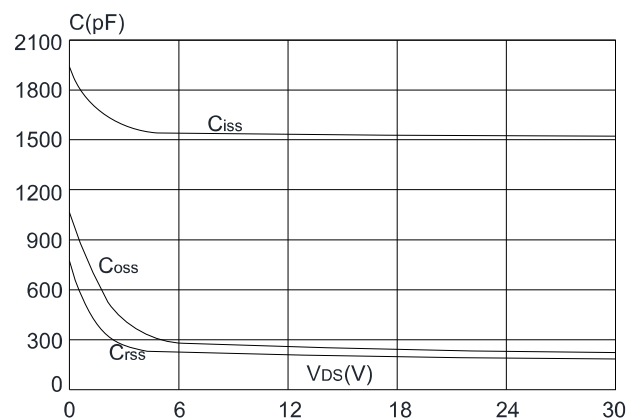
**Figure 4: Body Diode Characteristics**



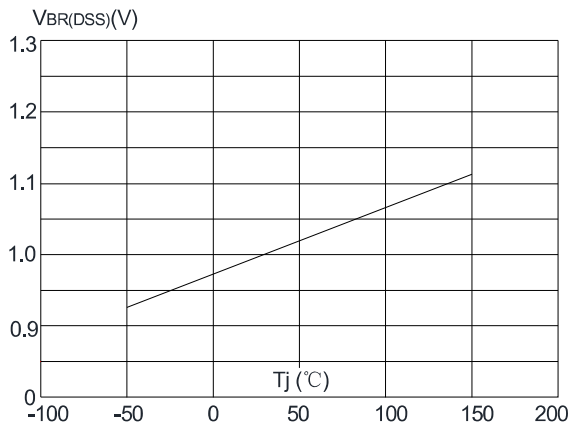
**Figure 5: Gate Charge Characteristics**



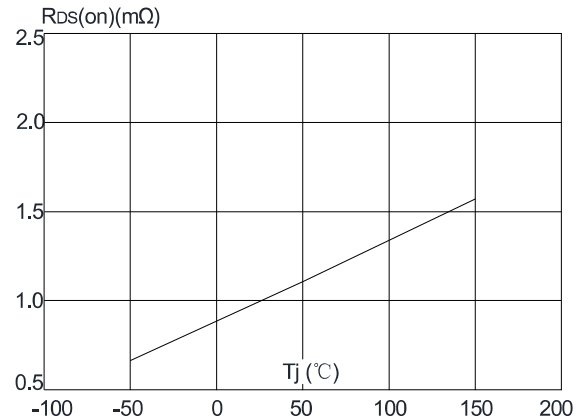
**Figure 6: Capacitance Characteristics**



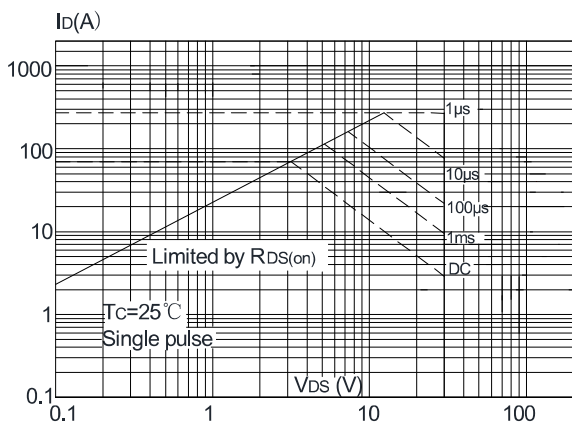
**Figure 7:** Normalized Breakdown Voltage vs. Junction Temperature



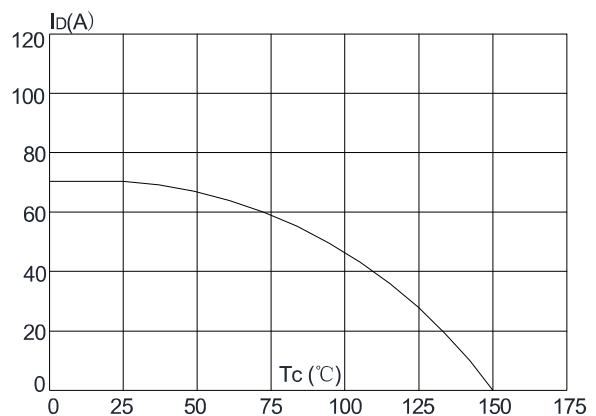
**Figure 8:** Normalized on Resistance vs. Junction Temperature



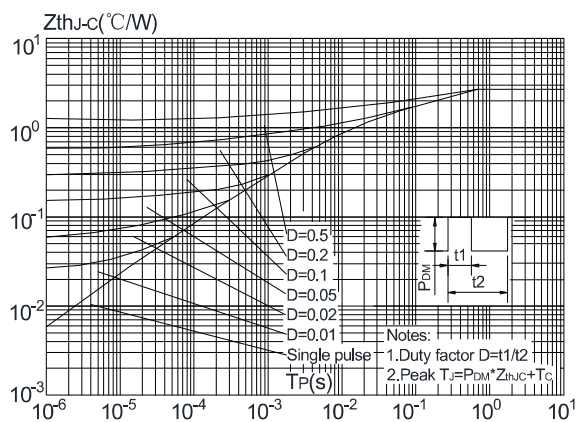
**Figure 9:** Maximum Safe Operating Area



**Figure 10:** Maximum Continuous Drain Current vs. Case Temperature



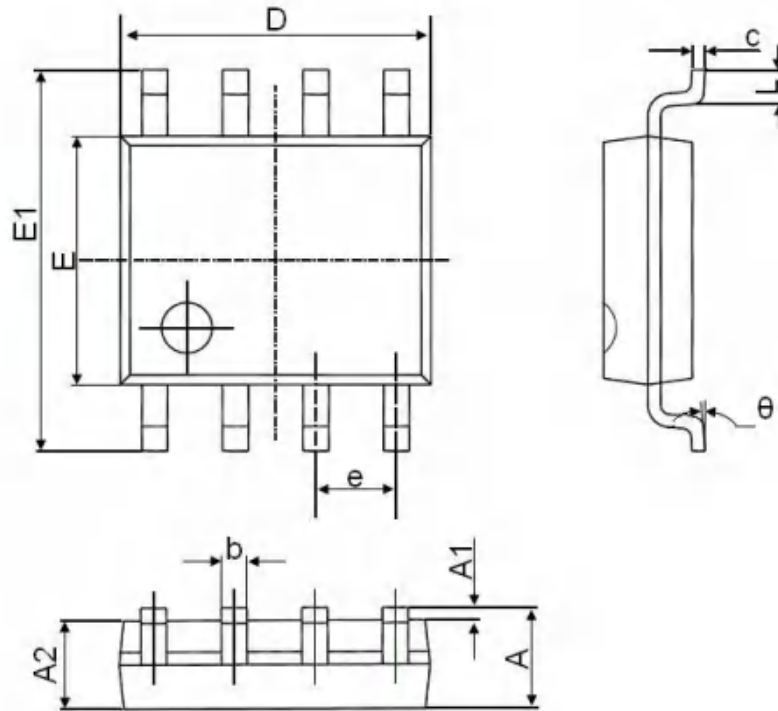
**Figure.11:** Maximum Effective Transient Thermal Impedance, Junction-to-Case



# AP3004S

N-Channel Enhancement Mosfet

## SOP-8 Package Information



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min.	Max.	Min.	Max.
A	1.350	1.750	0.053	0.069
A1	0.100	0.250	0.004	0.010
A2	1.350	1.550	0.053	0.061
b	0.330	0.510	0.013	0.020
c	0.170	0.250	0.006	0.010
D	4.700	5.100	0.185	0.200
E	3.800	4.000	0.150	0.157
E1	5.800	6.200	0.228	0.244
e	1.270(BSC)		0.050(BSC)	
L	0.400	1.270	0.016	0.050
$\theta$	0°	8°	0°	8°