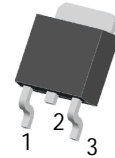




60N04 N-Channel Power MOSFET

$V_{(BR)DSS}$	$R_{DS(on)MAX}$	I_D
40V	13mΩ@10V	60A
	20mΩ@4.5V	

TO-252



- 1. GATE
- 2. DRAIN
- 3. SOURCE

DESCRIPTION

The MOSFET uses advanced trench technology and design to provide excellent $R_{DS(ON)}$ with low gate charge. It can be used in a wide variety of applications.

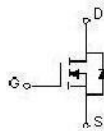
FEATURES

- High density cell design for ultra low $R_{DS(ON)}$
- Fully characterized Avalanche voltage and current
- Good stability and uniformity with high E_{AS}
- Excellent package for good heat dissipation
- Special process technology for high ESD capability

APPLICATIONS

- Power switching application
- Hard switched and high frequency circuits
- Uninterruptible Power Supply

EQUIVALENT CIRCUIT



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

Parameter	Symbol	Limit	Unit
Drain-Source Voltage	V_{DS}	40	V
Gate-Source Voltage	V_{GS}	±20	V
Continuous Drain Current	I_D	60	A
Pulsed Drain Current	I_{DM}	240	A
Single Pulsed Avalanche Energy	$E_{AS}^{(1)}$	400	mJ
Power Dissipation	P_D	1.25	W
Thermal Resistance from Junction to Ambient	$R_{\theta JA}$	100	$^\circ\text{C/W}$
Junction Temperature	T_J	150	$^\circ\text{C}$
Storage Temperature Range	T_{stg}	-55 ~ +150	$^\circ\text{C}$
Lead Temperature for Soldering Purposes(1/8" from case for 10s)	T_L	260	$^\circ\text{C}$

(1). E_{AS} condition: $V_{DD}=20V, L=0.5mH, R_G=25\Omega$, Starting $T_J = 25^\circ\text{C}$

$T_a=25\text{ }^\circ\text{C}$ unless otherwise specified

Parameter	Symbol	Test Condition	Min	Typ	Max	Unit
Off characteristics						
Drain-source breakdown voltage	$V_{(BR)DSS}$	$V_{GS}=0V, I_D=250\mu A$	40			V
Zero gate voltage drain current	I_{DSS}	$V_{DS}=40V, V_{GS}=0V$			1	μA
Gate-body leakage current	I_{GSS}	$V_{DS}=0V, V_{GS}=\pm 20V$			± 100	nA
On characteristics (note1)						
Gate-threshold voltage	$V_{GS(th)}$	$V_{DS}=V_{GS}, I_D=250\mu A$	1.2	1.5	2.5	V
Static drain-source on-state resistance	$R_{DS(on)}$	$V_{GS}=10V, I_D=20A$		8	13	m Ω
		$V_{GS}=4.5V, I_D=20A$		10.5	20	m Ω
Forward transconductance	g_{fs}	$V_{DS}=10V, I_D=20A$	15			S
Dynamic characteristics (note 2)						
Input capacitance	C_{iss}	$V_{DS}=20V, V_{GS}=0V,$ $f=1MHz$		1800		pF
Output capacitance	C_{oss}			280		
Reverse transfer capacitance	C_{rss}			190		
Switching characteristics (note 2)						
Total gate charge	Q_g	$V_{DS}=20V, V_{GS}=10V,$ $I_D=20A$		29		nC
Gate-source charge	Q_{gs}			4.5		
Gate-drain charge	Q_{gd}			6.4		
Turn-on delay time	$t_{d(on)}$	$V_{DD}=20V, I_D=2A,$ $V_{GS}=10V, R_G=3\Omega,$ $R_L=1\Omega$		6.4		ns
Turn-on rise time	t_r			17.2		
Turn-off delay time	$t_{d(off)}$			29.6		
Turn-off fall time	t_f			16.8		
Drain-Source Diode Characteristics						
Drain-source diode forward voltage(note1)	V_{SD}	$V_{GS}=0V, I_S=20A$			1.2	V
Continuous drain-source diode forward current	I_S				60	A
Pulsed drain-source diode forward current	I_{SM}				240	A

Notes:

1. Pulse Test : Pulse Width $\leq 300\mu s$, duty cycle $\leq 2\%$.
2. Guaranteed by design, not subject to production.

