UNIVERSAL PARTS SEMICONDUCTOR

UP60N04

N-Channel Enhancement Mode MOSFET

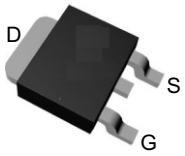
Features

. 40V/60A,
  $R_{DS(ON)}$=8mΩ (Max.) @ V_{GS}=10V
  $R_{DS(ON)}$=13mΩ (Max.) @ V_{GS}=4.5V
. Reliable and Rugged
. Lead Free and Green Devices Available
  (RoHS Compliant)

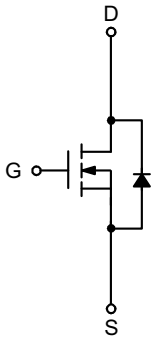
Applications

. Power Management in Desktop Computer or
  DC/DC Converters.

Pin Description



Top View of TO-252-3



N-Channel MOSFET

Absolute Maximum Ratings

Symbol	Parameter		Rating	Unit
Common Ratings (T_A=25°C Unless Otherwise Noted)				
V_{DSS}	Drain-Source Voltage		40	V
$BV_{DS(Avalanche)}$*	Drain-Source Avalanche Voltage (Maximum)		45	
V_{GSS}	Gate-Source Voltage		±20	
T_J	Maximum Junction Temperature		175	°C
T_{STG}	Storage Temperature Range		-55 to 175	°C
I_S	Diode Continuous Forward Current		40	A
I_{DP}	300μs Pulse Drain Current Tested	T_C=25°C	160	A
		T_C=100°C	90	
I_D	Continuous Drain Current	T_C=25°C	60***	A
		T_C=100°C	48	
P_D	Maximum Power Dissipation	T_C=25°C	60	W
		T_C=100°C	30	
R_{qJC}	Thermal Resistance-Junction to Case		2.5	°C/W
R_{qJA}	Thermal Resistance-Junction to Ambient		50	°C/W
E_{AS}**	Drain-Source Avalanche Energy	L=0.5mH	100	mJ

Notes：

* Avalanche single pulse test and avalanche period time tav≦100μs, duty<1% .

** Avalanche test condition: T_J=25°C, L=0.5mH, I_{AS}=20A, V_{DD}=30V, and V_{GS}=10V.

*** Current limited by bond wire.

Electrical Characteristics (T_A = 25?C unless otherwise noted)

Symbol	Parameter	Test Conditions	UTD60N04			Unit
			Min.	Typ.	Max.	
Static Characteristics						
BV_{DSS}	Drain-Source Breakdown Voltage	V_{GS}=0V, I_{DS}=250mA	40	-	-	V
I_{DSS}	Zero Gate Voltage Drain Current	V_{DS}=32V, V_{GS}=0V	-	-	1	mA
		T_J=85°C	-	-	30	
$V_{GS(th)}$	Gate Threshold Voltage	V_{DS}=V_{GS}, I_{DS}=250mA	1.5	2	3	V
I_{GSS}	Gate Leakage Current	V_{GS}=±20V, V_{DS}=0V	-	-	±100	nA
$R_{DS(ON)}$ a	Drain-Source On-state Resistance	V_{GS}=10V, I_{DS}=20A	-	6.2	8	mW
		V_{GS}=4.5V, I_{DS}=10A	-	9.2	13	

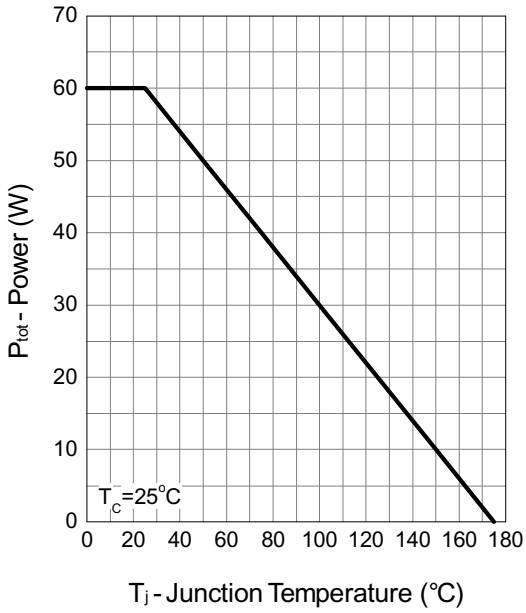
Electrical Characteristics (Cont.) (T_A = 25?C unless otherwise noted)

Symbol	Parameter	Test Conditions	UP60N04			Unit
			Min.	Typ.	Max.	
Diode Characteristics						
V_{SD} [a]	Diode Forward Voltage	I_{SD}=20A, V_{GS}=0V	-	0.8	1.1	V
t_{rr}	Reverse Recovery Time	I_{DS}=40A, dI_{SD}/dt=100A/ms	-	28	-	ns
Q_{rr}	Reverse Recovery Charge		-	24	-	nC
Dynamic Characteristics [b]						
R_G	Gate Resistance	V_{GS}=0V,V_{DS}=0V,F=1MHz	-	1.4	-	W
C_{iss}	Input Capacitance	V_{GS}=0V, V_{DS}=20V, Frequency=1.0MHz	-	1460	-	pF
C_{oss}	Output Capacitance		-	180	-	
C_{rss}	Reverse Transfer Capacitance		-	146	-	
$t_{d(ON)}$	Turn-on Delay Time	V_{DD}=20V, R_L=20W, I_{DS}=1A, V_{GEN}=10V, R_G=6W	-	11	21	ns
t_r	Turn-on Rise Time		-	13	24	
$t_{d(OFF)}$	Turn-off Delay Time		-	37	67	
t_f	Turn-off Fall Time		-	11	21	
Gate Charge Characteristics [b]						
Q_g	Total Gate Charge	V_{DS}=20V, V_{GS}=10V, I_{DS}=40A	-	31.2	44	nC
Q_{gs}	Gate-Source Charge		-	3.8	-	
Q_{gd}	Gate-Drain Charge		-	9	-	

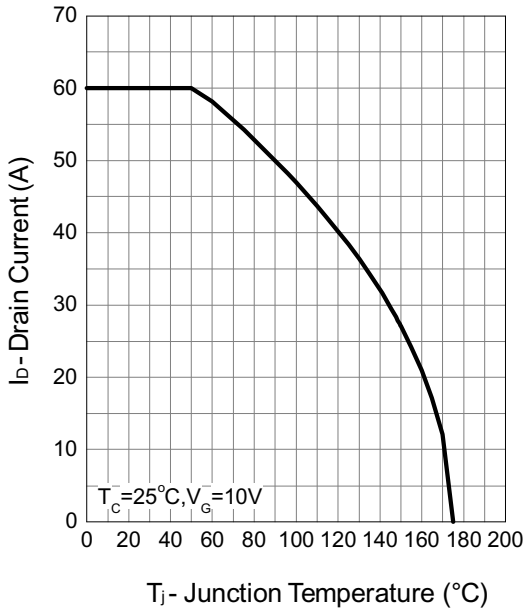
Note a : Pulse test ; pulse width?300ms, duty cycle?2%.
Note b : Guaranteed by design, not subject to production testing.

Typical Operating Characteristics

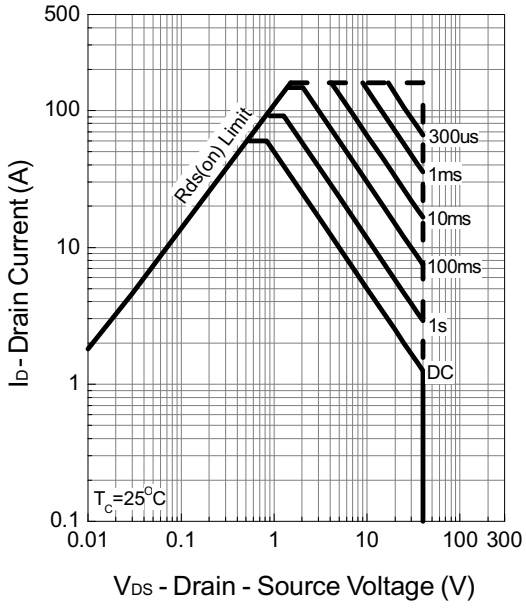
Power Dissipation



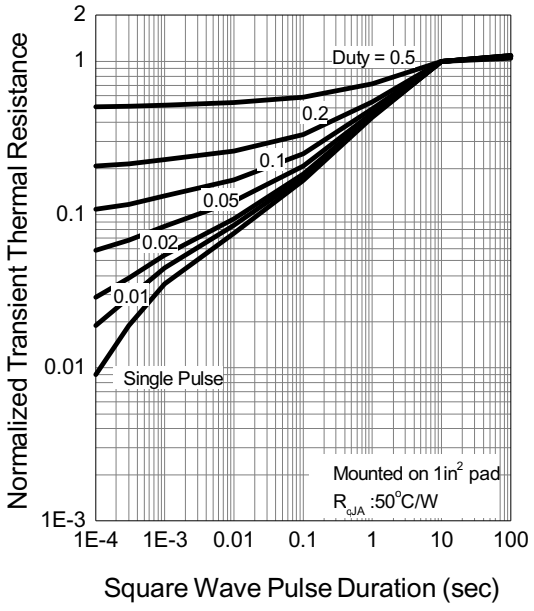
Drain Current



Safe Operation Area

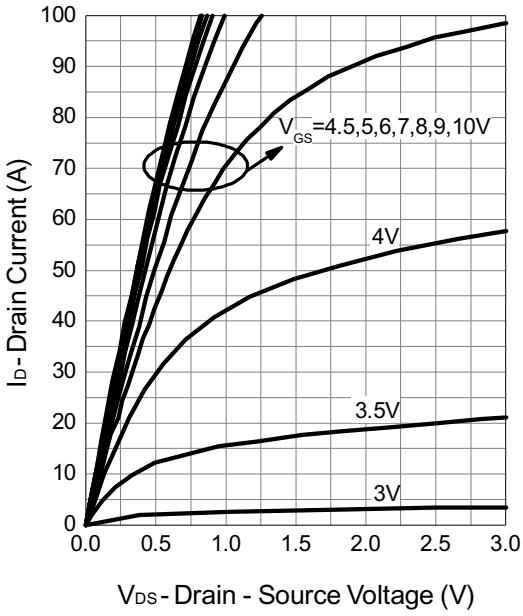


Thermal Transient Impedance

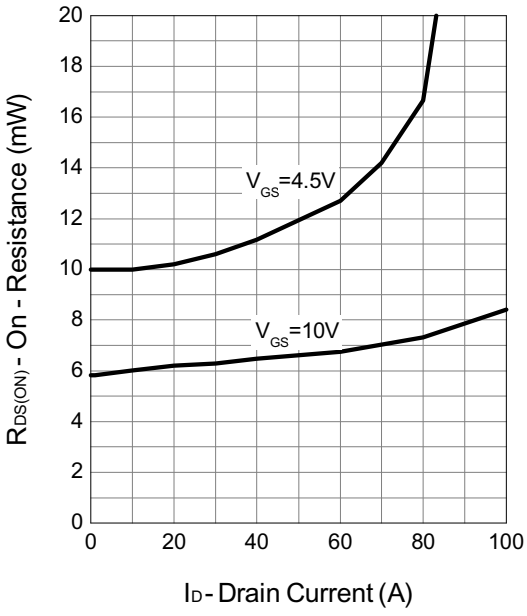


Typical Operating Characteristics (Cont.)

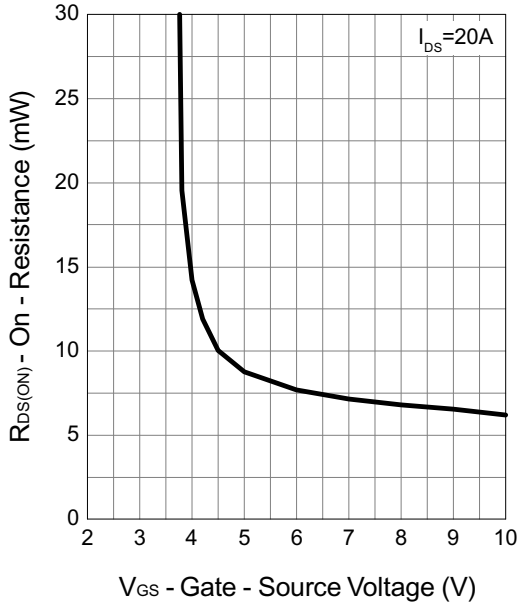
Output Characteristics



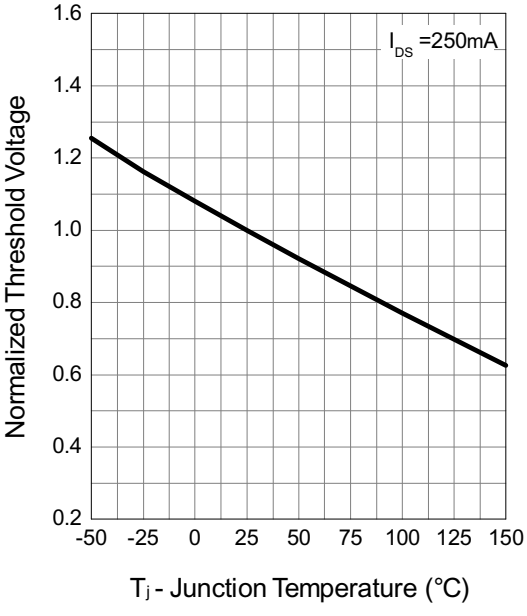
Drain-Source On Resistance



Gate-Source On Resistance

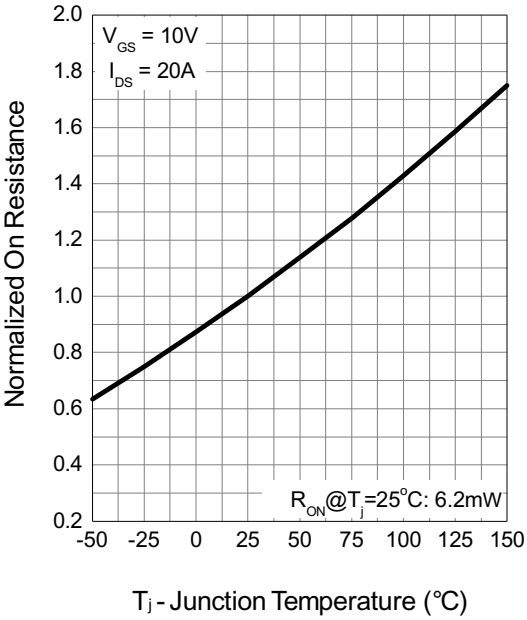


Gate Threshold Voltage



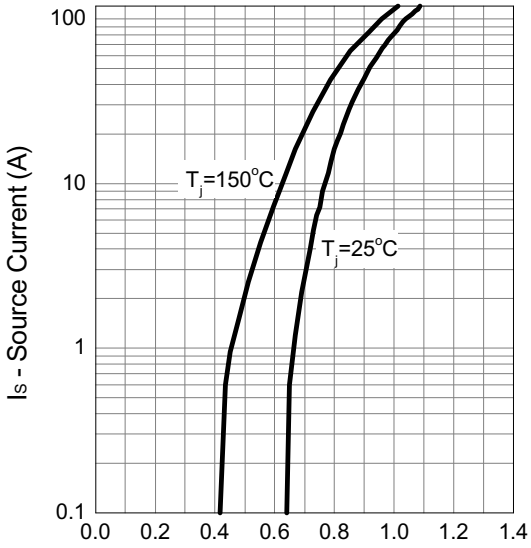
Typical Operating Characteristics (Cont.)

Drain-Source On Resistance



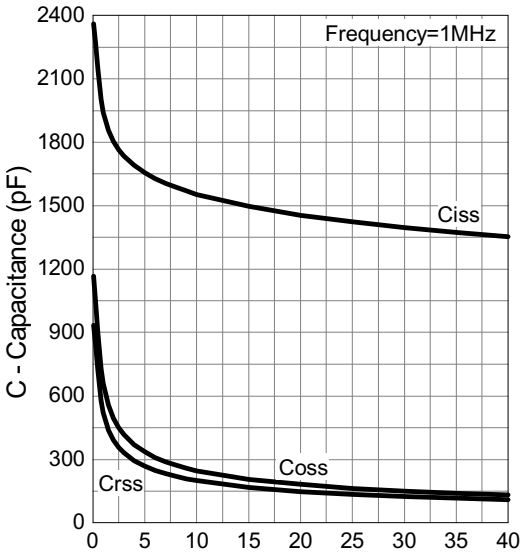
T_j - Junction Temperature (°C)

Source-Drain Diode Forward



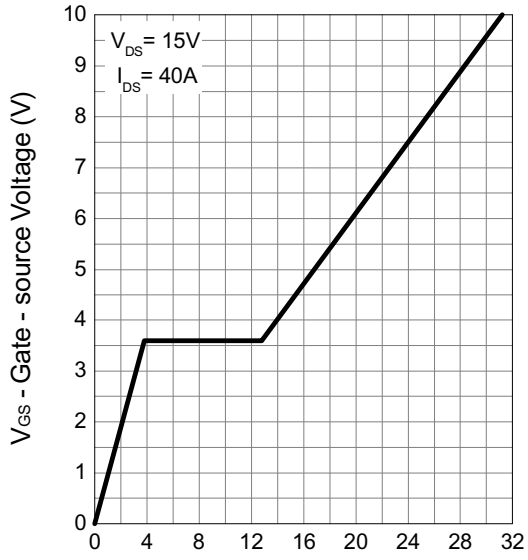
V_{SD} - Source - Drain Voltage (V)

Capacitance



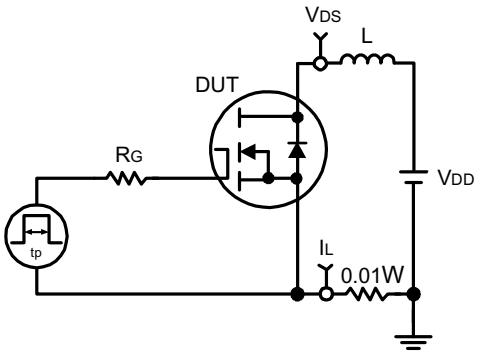
V_{DS} - Drain - Source Voltage (V)

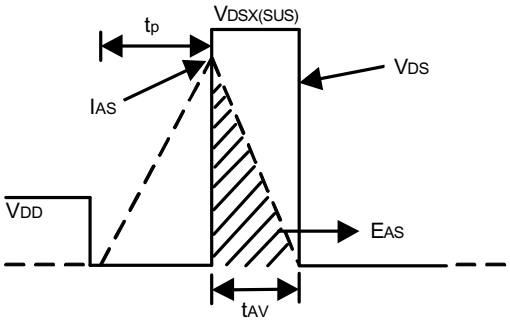
Gate Charge



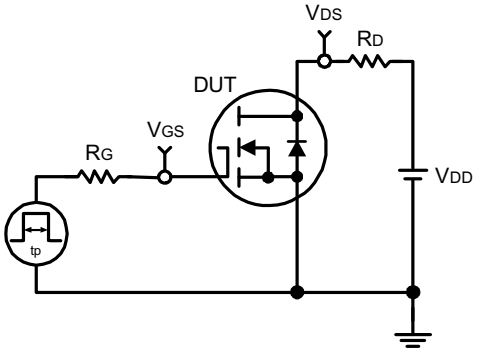
Q_G - Gate Charge (nC)

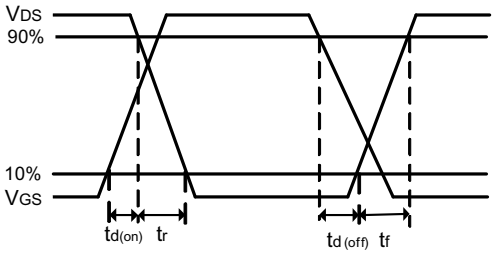
Avalanche Test Circuit and Waveforms





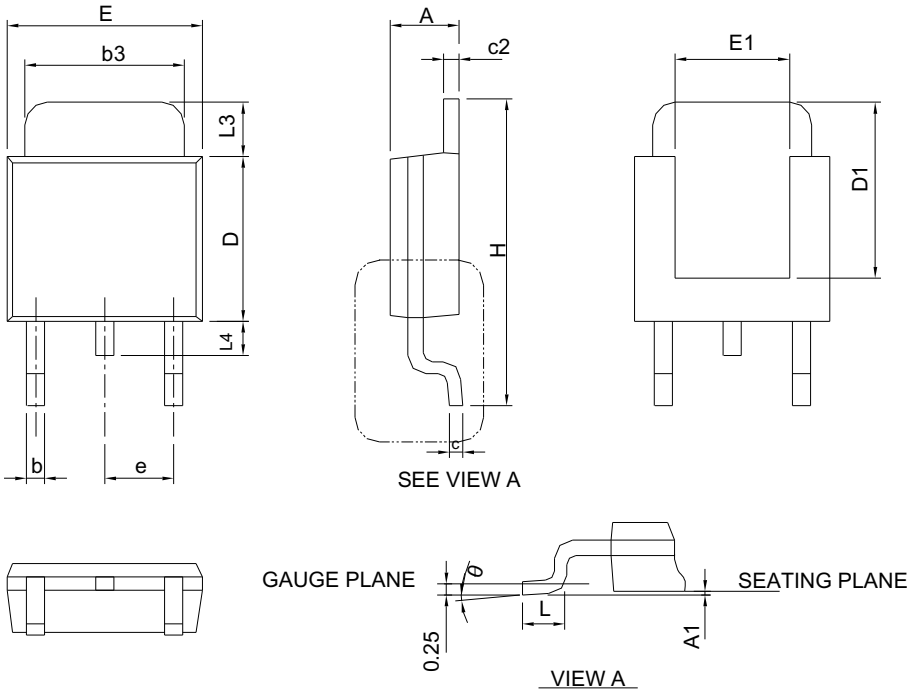
Switching Time Test Circuit and Waveforms





Package Information

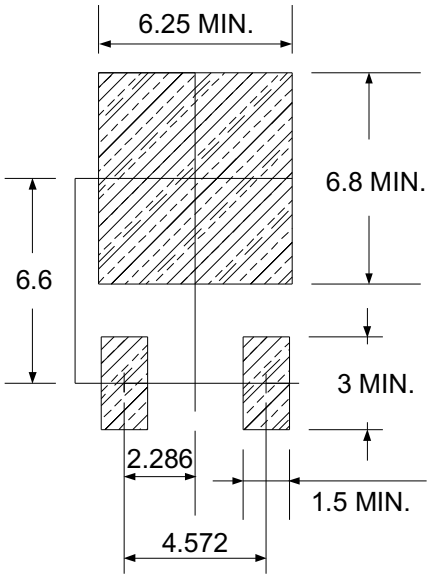
TO-252-3



SYMBOL	TO-252-3			
	MILLIMETERS		INCHES	
	MIN.	MAX.	MIN.	MAX.
A	2.18	2.39	0.086	0.094
A1	-	0.13	-	0.005
b	0.50	0.89	0.020	0.035
b3	4.95	5.46	0.195	0.215
c	0.46	0.61	0.018	0.024
c2	0.46	0.89	0.018	0.035
D	5.33	6.22	0.210	0.245
D1	4.57	6.00	0.180	0.236
E	6.35	6.73	0.250	0.265
E1	3.81	6.00	0.150	0.236
e	2.29 BSC		0.090 BSC	
H	9.40	10.41	0.370	0.410
L	0.90	1.78	0.035	0.070
L3	0.89	2.03	0.035	0.080
L4	-	1.02	-	0.040
θ	0°	8°	0°	8°

Note : Follow JEDEC TO-252 .

RECOMMENDED LAND PATTERN



UNIT: mm