

SE7578

N-Channel Enhancement-Mode MOSFET

Revision: A

General Description

This series is a high voltage power MOSFET and is designed to have better characteristics, such as fast switching time, low gate charge, low on-state resistance and have a high rugged avalanche characteristics

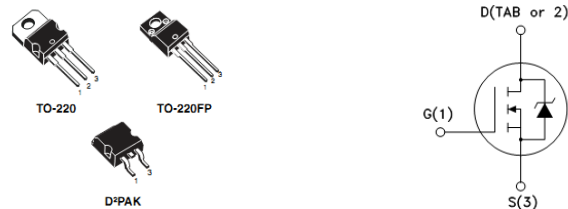
Features

For a single MOSFET

- $V_{DS} = 75V$
- $R_{DS(ON)} = 6.8m\Omega @ V_{GS}=10V, I_D=40A$

Pin configurations

See Diagram below



Absolute Maximum Ratings

Parameter		Symbol	Rating	Units
Drain-Source Voltage		V_{DS}	75	V
Gate-Source Voltage		V_{GS}	± 20	V
Drain Current ¹	Continuous	I_D	80	A
	Pulsed		320	
Avalanche Energy Single Pulsed ³		E_{AS}	700	mJ
Peak Diode Recovery dv/dt^2		Dv/dt	15	V/ns
Power Dissipation	TO-220/D ² PAK	P_D	300	W
	TO-220F		45	
Operating Junction Temperature Range		T_J	-55 to 150	°C

Note 1: Current limited by package

Note 2: $I_{SD} \leq 80A, di/dt \leq 300A/\mu s, V_{DD} \leq V_{(BR)DSS}, T_J \leq T_{JMAX}$

Note 3: Starting $T_J=25^\circ C, I_D=40A, V_{DD}=37.5V$

Thermal Resistance

Symbol	Parameter	TO-220 series	D ² PAK	Units
$R_{\theta JA}$	Junction to Ambient	62.5		°C/W

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Electrical Characteristics (T _J =25°C unless otherwise noted)						
Symbol	Parameter	Test Conditions	Min	Typ	Max	Units
OFF CHARACTERISTICS (Note 2)						
B _V DSS	Drain-Source Breakdown Voltage	V _{GS} =0 V, I _D =250μA,	75			V
I _{DSS}	Drain to Source Leakage Current	V _{DS} = 75V, V _{GS} =0V			1	μA
I _{GSS}	Gate-Body Leakage Current	V _{GS} =20 V			100	nA
V _{GS(th)}	Gate Threshold Voltage	V _{DS} = V _{GS} , I _D =250μA	2.0	3.0	4.0	V
R _{DS(ON)}	Static Drain-Source On-Resistance	V _{GS} =10V, I _D =48A		6.8	8.5	mΩ
DYNAMIC PARAMETERS						
C _{iss}	Input Capacitance	V _{GS} =0V, V _{DS} =25V, f=1MHz		3700		pF
C _{oss}	Output Capacitance			730		pF
C _{rss}	Reverse Transfer Capacitance			240		pF
SWITCHING PARAMETERS						
Q _g	Total Gate Charge ²	V _{GS} =10V, V _{DS} =60V, I _D =80A		117	160	nC
Q _{gs}	Gate Source Charge			27		nC
Q _{gd}	Gate Drain Charge			47		nC
t _{d(on)}	Turn-On Delay Time	V _{DD} =37.5V, R _{GEN} =4.7Ω I _D =45A		25		ns
t _{d(off)}	Turn-Off Delay Time			66		ns
t _{d(r)}	Turn-On Rise Time			100		ns
t _{d(f)}	Turn-Off Fall Time			30		ns
Source-Drain Diode Characteristics						
V _{SD} ²	Drain-Source Diode Forward Voltage	V _{GS} =0V, I _S =80A			1.5	V
I _S	Max Drain-Source Diode Current				80	A
I _{SM} ¹	Max Pulse Drain-Source Current				320	A
t _{rr}	Reverse Recovery Time	V _{GS} =0V, I _S =80A		132		ns
Q _{RR}	Reverse Recovery Charge	di _F /dt=100A/μs ¹		660		μC

Note 1: Pulse width limited by safe operating area

Note 1: Pulse duration=300μs, duty cycle 1.5%

Typical Characteristics

Figure 1. Safe operating area for TO-220 - D²PAK

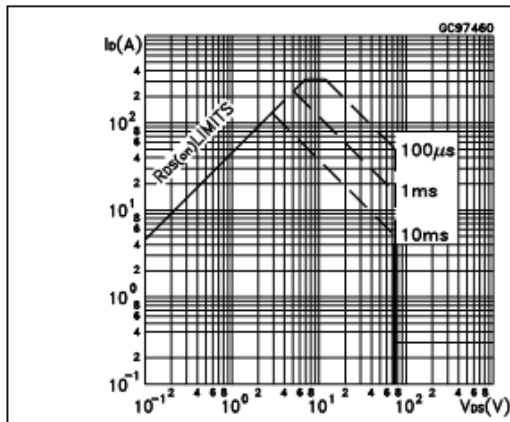


Figure 2. Thermal impedance for TO-220 - D²PAK

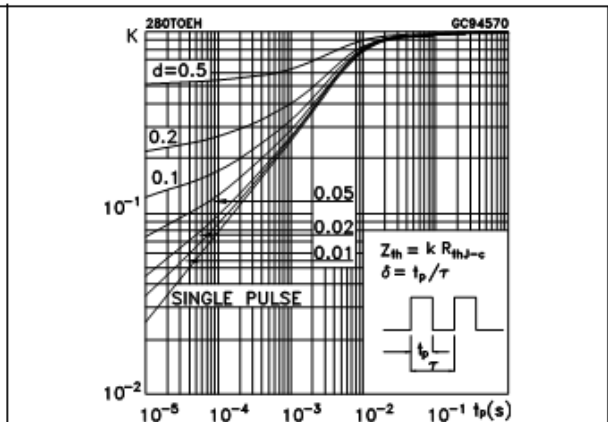


Figure 3. Safe operating area for TO-220FP

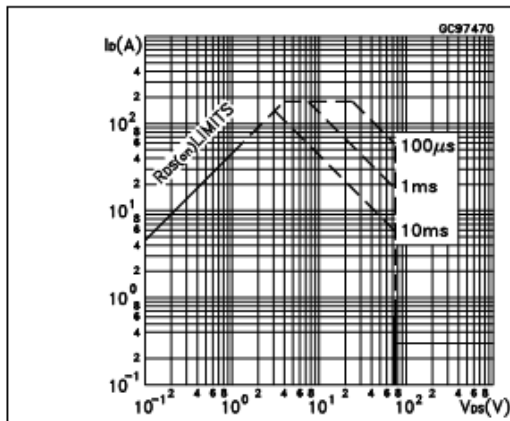


Figure 4. Thermal impedance for TO-220FP

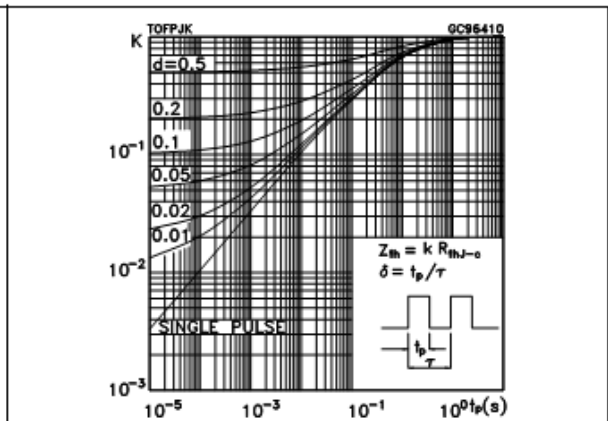


Figure 5. Output characteristics

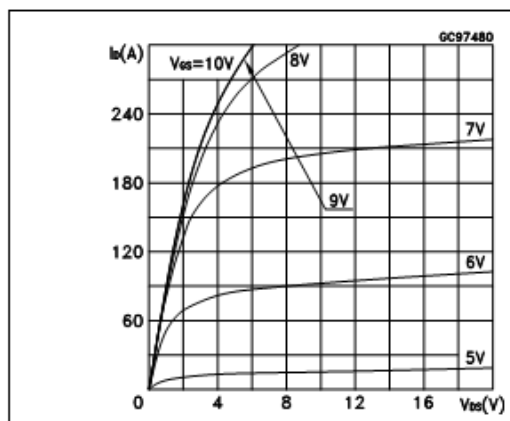
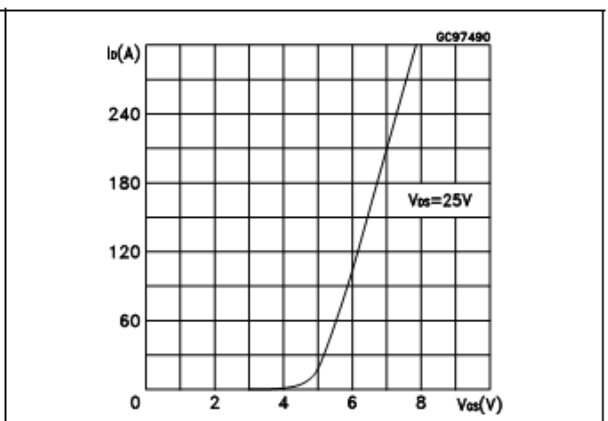


Figure 6. Transfer characteristics



Typical Characteristics

Figure 7. Transconductance

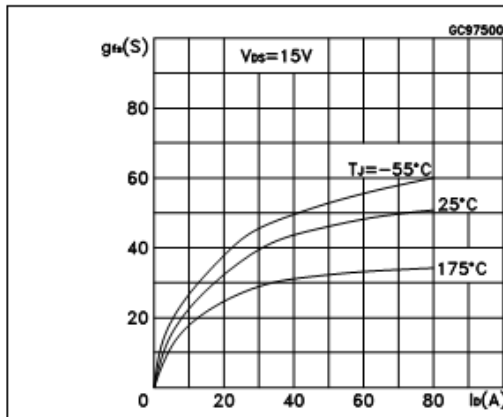


Figure 8. Static drain-source on resistance

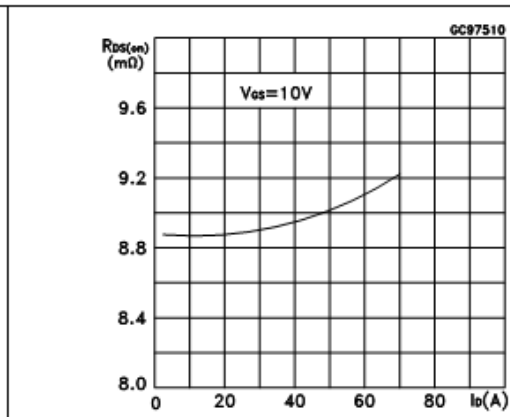


Figure 9. Gate charge vs gate-source voltage

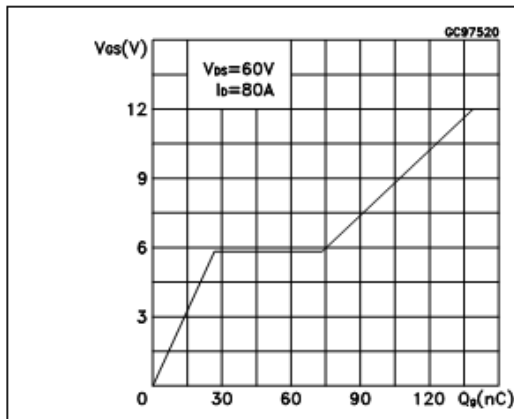


Figure 10. Capacitance variations

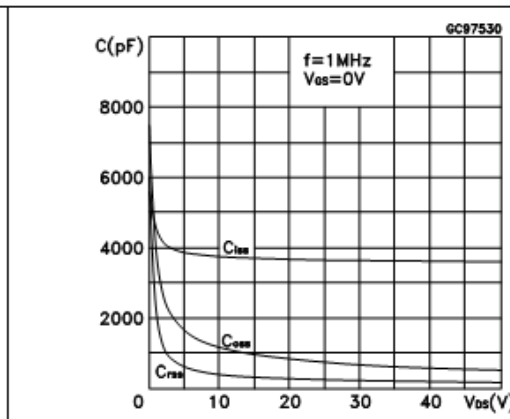


Figure 11. Normalized gate threshold voltage vs temperature

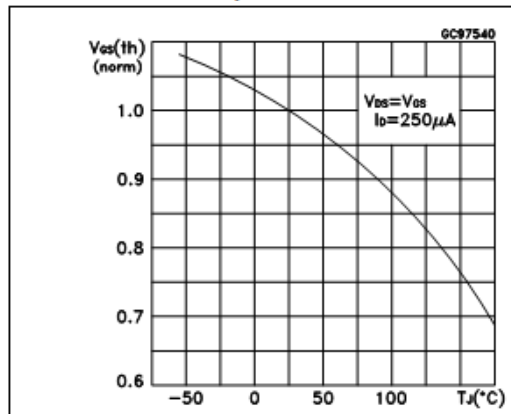
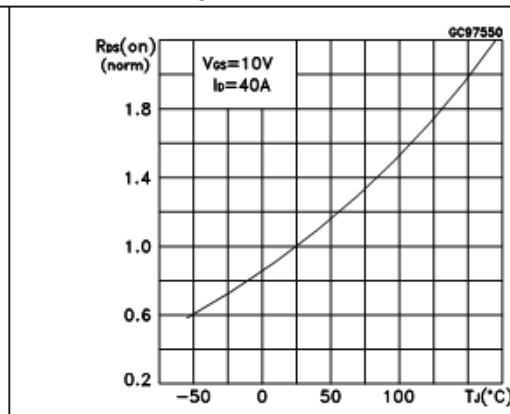


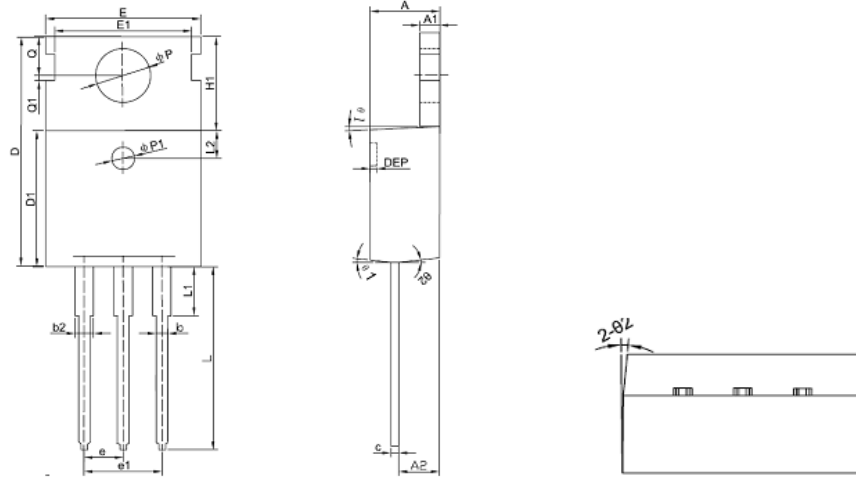
Figure 12. Normalized on resistance vs temperature



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Package Outline Dimension

TO-220

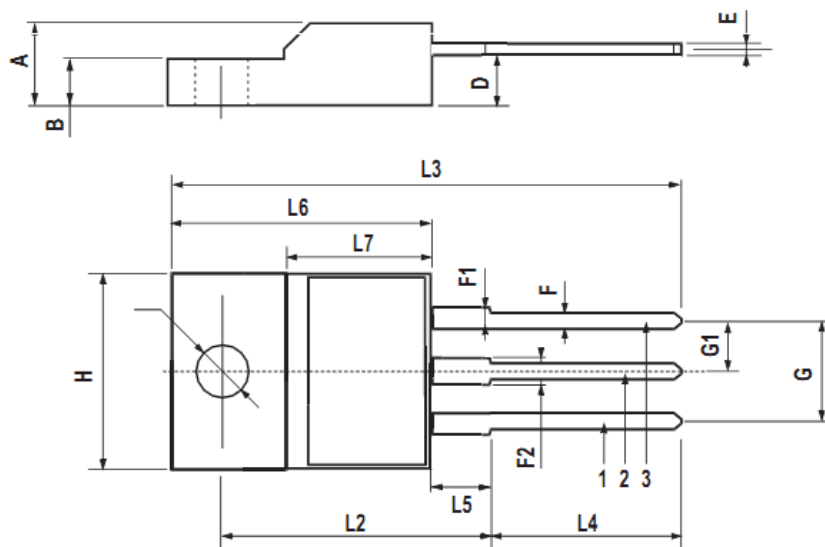


Symbol	Dimension In Millimeters			Dimension In Inches		
	Min	Nom	Max	Min	Nom	Max
A	4.400	4.550	4.700	0.173	0.179	0.185
A1	1.270	1.300	1.330	0.050	0.051	0.052
A2	2.590	2.690	2.790	0.102	0.106	0.110
b	0.770	-	0.900	0.030	-	0.035
b2	1.230	-	1.360	0.048	-	0.054
c	0.480	0.500	0.520	0.019	0.020	0.020
D	15.100	15.400	15.700	-	0.606	-
D1	9.000	9.100	9.200	0.354	0.358	0.362
DEP	0.050	0.285	0.520	0.002	0.011	0.020
E	10.060	10.160	10.260	0.396	0.400	0.404
E1	-	8.700	-	-	0.343	-
ΦP1	1.400	1.500	1.600	0.055	0.059	0.063
e	2.54BSC			0.1BSC		
e1	5.08BSC			0.2BSC		
H1	6.100	6.300	6.500	0.240	0.248	0.256
L	12.750	12.960	13.170	0.502	0.510	0.519
L1	-	-	3.950	-	-	0.156
L2	1.85REF			0.073REF		
ΦP	3.570	3.600	3.630	0.141	0.142	0.143
Q	2.730	2.800	2.870	0.107	0.110	0.113
Q1	-	0.200	-	-	0.008	-
Θ1	5 ⁰	7 ⁰	9 ⁰	5 ⁰	7 ⁰	9 ⁰
Θ2	1 ⁰	3 ⁰	5 ⁰	1 ⁰	3 ⁰	5 ⁰

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Package Outline Dimension

TO-220F

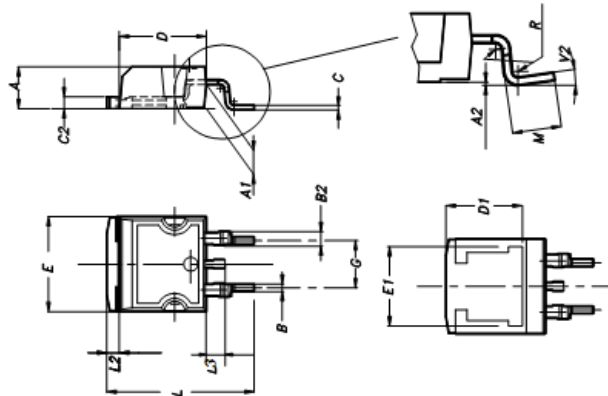


DIM.	mm.			inch		
	MIN.	TYP	MAX.	MIN.	TYP.	MAX.
A	4.4		4.6	0.173		0.181
B	2.5		2.7	0.098		0.106
D	2.5		2.75	0.098		0.108
E	0.45		0.7	0.017		0.027
F	0.75		1	0.030		0.039
F1	1.15		1.5	0.045		0.067
F2	1.15		1.5	0.045		0.067
G	4.95		5.2	0.195		0.204
G1	2.4		2.7	0.094		0.106
H	10		10.4	0.393		0.409
L2		16			0.630	
L3	28.6		30.6	1.126		1.204
L4	9.8		10.6	.0385		0.417
L5	2.9		3.6	0.114		0.141
L6	15.9		16.4	0.626		0.645
L7	9		9.3	0.354		0.366
∅	3		3.2	0.118		0.126

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Package Outline Dimension

D2PAK



DIM.	mm.			inch		
	MIN.	TYP	MAX.	MIN.	TYP.	MAX.
A	4.4		4.6	0.173		0.181
A1	2.49		2.69	0.098		0.106
A2	0.03		0.23	0.001		0.009
B	0.7		0.93	0.027		0.036
B2	1.14		1.7	0.044		0.067
C	0.45		0.6	0.017		0.023
C2	1.23		1.36	0.048		0.053
D	8.95		9.35	0.352		0.368
D1		8			0.315	
E	10		10.4	0.393		
E1		8.5			0.334	
G	4.88		5.28	0.192		0.208
L	15		15.85	0.590		0.625
L2	1.27		1.4	0.050		0.055
L3	1.4		1.75	0.055		0.068
M	2.4		3.2	0.094		0.126
R		0.4			0.015	
V2	0°		4°			

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