


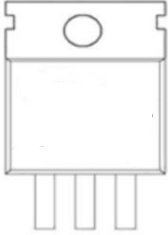
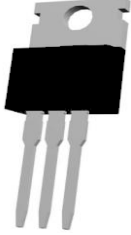
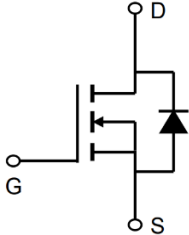


TM80N04P

N-Channel Enhancement Mosfet

<p>General Description</p> <ul style="list-style-type: none"> • Low $R_{DS(ON)}$ • RoHS and Halogen-Free Compliant <p>Applications</p> <ul style="list-style-type: none"> • Load switch • PWM 	<p>General Features</p> <p>$V_{DS} = 40V$ $I_D = 90A$ $R_{DS(ON)} = 5.3m\Omega (typ.) @ V_{GS} = 10V$</p> <p>100% UIS Tested 100% R_g Tested</p> 
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P:TO-220AB

Marking: 80N04

G D S

Absolute Maximum Ratings: ($T_c = 25^\circ C$ unless otherwise noted)

Symbol	Parameter	Ratings	Units
V_{DS}	Drain-Source Voltage	40	V
V_{GS}	Gate-Source Voltage	± 20	V
I_D	Continuous Drain Current ⁻¹	80	A
	Continuous Drain Current- $T_C=100^\circ C$	56	
	Pulsed Drain Current ²	250	
E_{AS}	Single Pulse Avalanche Energy ³	670	mJ
P_D	Power Dissipation ⁴	90	W
T_J, T_{STG}	Operating and Storage Junction Temperature Range	- 55 to +175	$^\circ C$

Thermal Characteristics:

Symbol	Parameter	Max	Units
$R_{\theta JC}$	Thermal Resistance, Junction to Case ¹	1.67	$^\circ C/W$
$R_{\theta JA}$	Thermal Resistance, Junction to Ambient ¹	---	

Electrical Characteristics: ($T_C=25^\circ\text{C}$ unless otherwise noted)

Symbol	Parameter	Conditions	Min	Typ	Max	Units
Off Characteristics						
BV_{DSS}	Drain-Source Breakdown Voltage	$V_{GS}=0V, I_D=250\ \mu A$	40		---	V
I_{DSS}	Zero Gate Voltage Drain Current	$V_{GS}=0V, V_{DS}=40V$	---	---	1	μA
I_{GSS}	Gate-Source Leakage Current	$V_{GS}=\pm 20V, V_{DS}=0A$	---	---	± 100	nA
On Characteristics						
$V_{GS(th)}$	GATE-Source Threshold Voltage	$V_{GS}=V_{DS}, I_D=250\ \mu A$	1.2	1.8	2.5	V
$R_{DS(on)}$	Drain-Source On Resistance ²	$V_{GS}=10V, I_D=20A$	---	5.3	6.5	m Ω
		$V_{GS}=4.5V, I_D=A$	---	---	---	
G_{FS}	Forward Transconductance	$V_{DS}=10V, I_D=20A$	15	---	---	S
Dynamic Characteristics						
C_{iss}	Input Capacitance	$V_{DS}=20V, V_{GS}=0V, f=1MHz$	---	3298	---	pF
C_{oss}	Output Capacitance		---	750	---	
C_{rss}	Reverse Transfer Capacitance		---	390	---	
Switching Characteristics						
$t_{d(on)}$	Turn-On Delay Time	$V_{DD}=20V, R_L=1\ \Omega$ $R_{GEN}=3\ \Omega, V_{GS}=10V$	---	11	---	ns
t_r	Rise Time		---	10	---	ns
$t_{d(off)}$	Turn-Off Delay Time		---	38	---	ns
t_f	Fall Time		---	11	---	ns
Q_g	Total Gate Charge	$V_{GS}=10V, V_{DS}=20V,$ $I_D=20A$	---	50	---	nC
Q_{gs}	Gate-Source Charge		---	12	---	nC
Q_{gd}	Gate-Drain "Miller" Charge		---	13	---	nC
Drain-Source Diode Characteristics						
V_{SD}	Source-Drain Diode Forward Voltage ²	$V_{GS}=0V, I_S=10A$	---	---	-1.2	V
I_S	Diode Forward Current (Note 2)	---	---	---	90	A
T_{rr}	Reverse Recovery Time	$T_J = 25^\circ\text{C}, I_F = 20A$ $di/dt = 100A/\mu s^{(Note3)}$	---	33	---	NS
Q_{rr}	Reverse Recovery Charge		---	34	---	NC

Notes:

1. Repetitive Rating: Pulse width limited by maximum junction temperature.
2. Surface Mounted on FR4 Board, $t \leq 10\ \text{sec}$.
3. Pulse Test: Pulse Width $\leq 300\ \mu s$, Duty Cycle $\leq 2\%$.
4. Guaranteed by design, not subject to production
5. E_{AS} condition : $T_J=25^\circ\text{C}, V_{DD}=20V, V_G=10V, L=1mH, R_g=25\ \Omega, I_{AS}=36A$



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Typical Characteristics: ($T_C=25^{\circ}\text{C}$ unless otherwise noted)

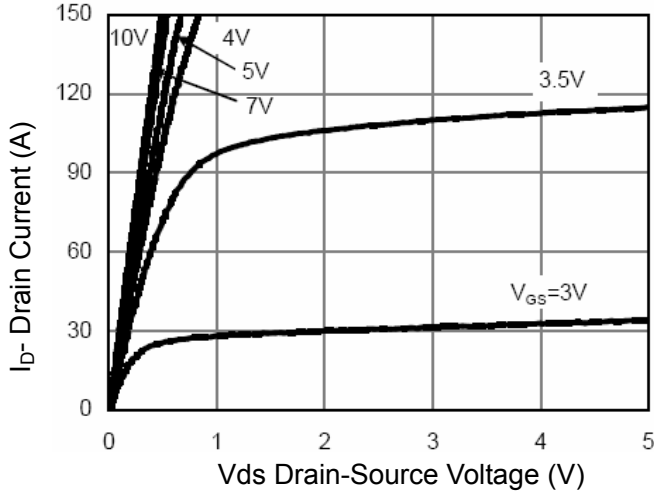


Figure 1 Output Characteristics

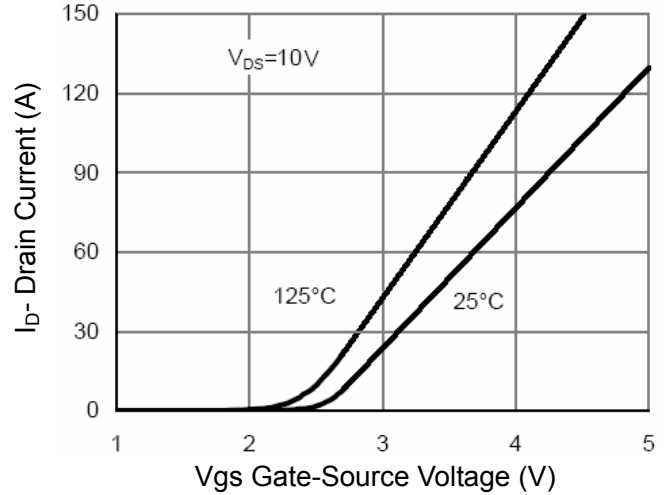


Figure 2 Transfer Characteristics

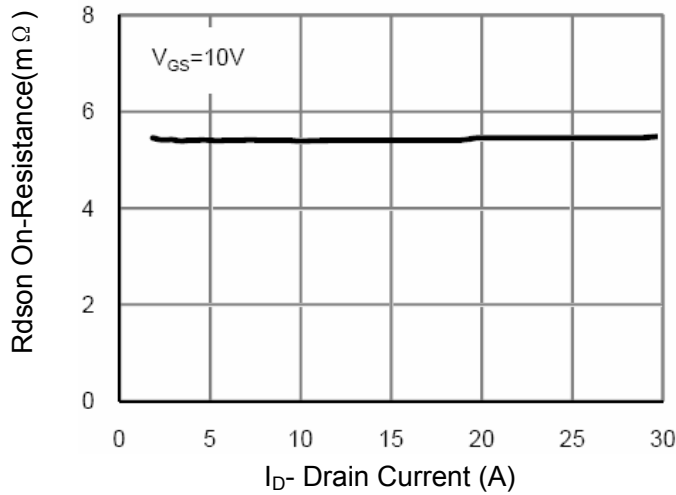


Figure 3 Rdson- Drain Current

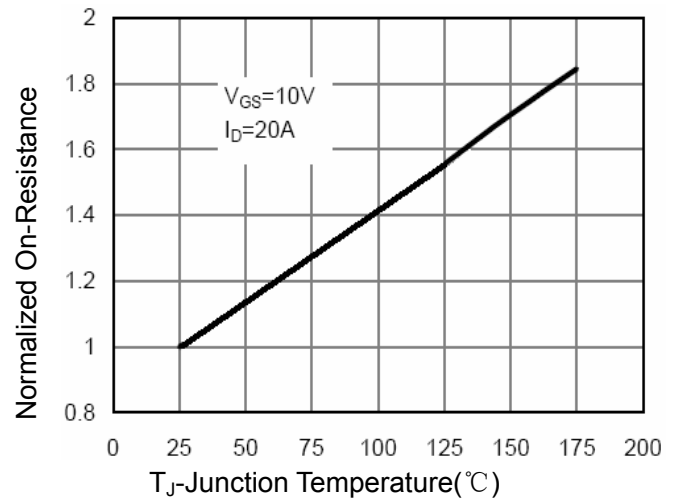


Figure 4 Rdson-Junction Temperature

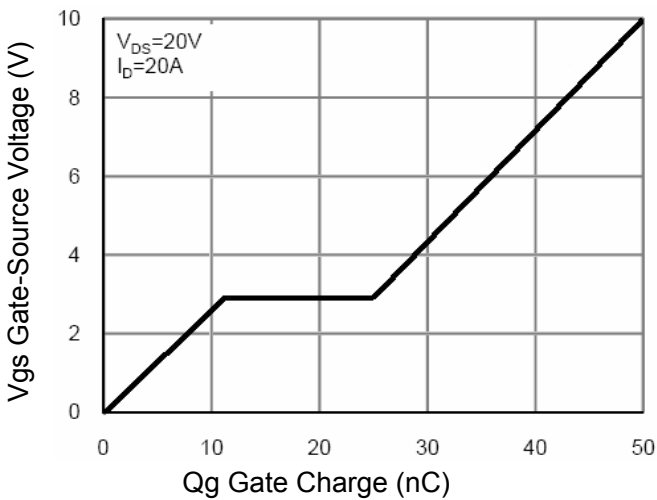


Figure 5 Gate Charge

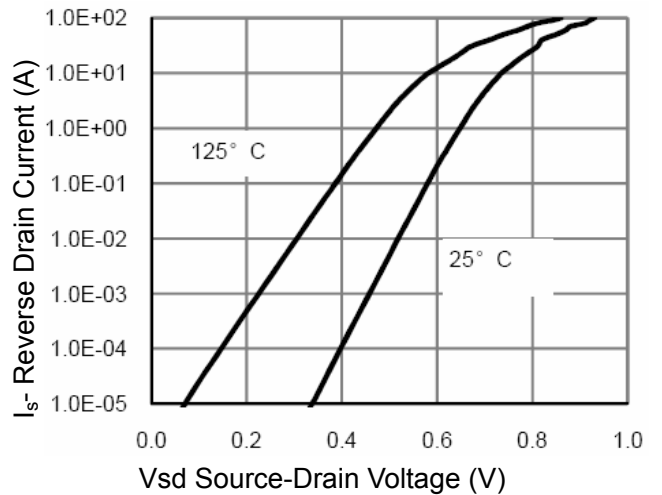


Figure 6 Source- Drain Diode Forward



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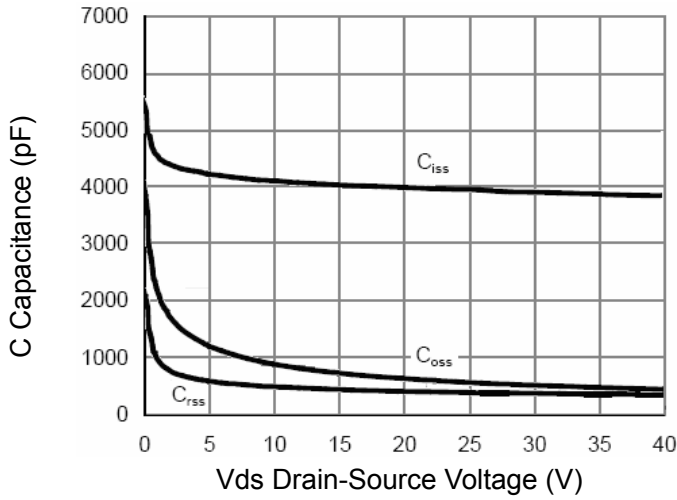


Figure 7 Capacitance vs Vds

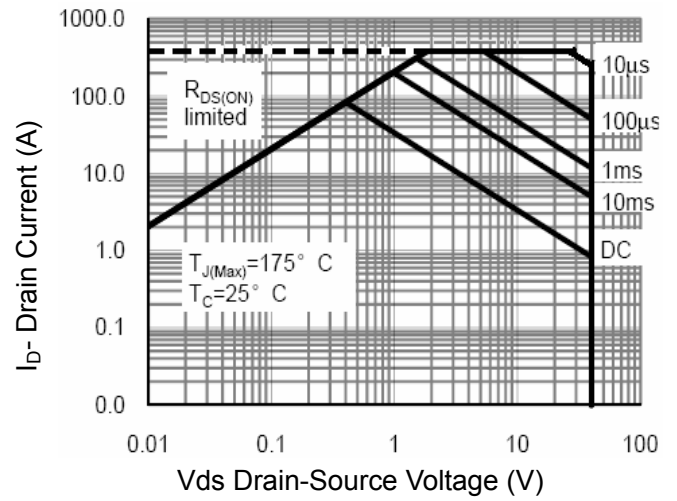


Figure 8 Safe Operation Area

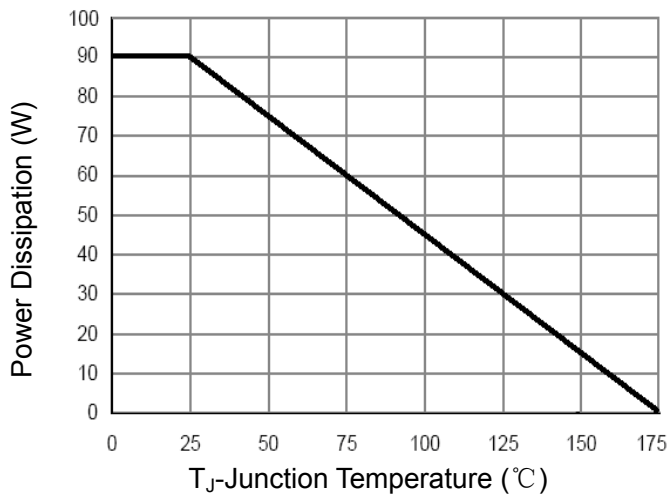


Figure 9 Power De-rating

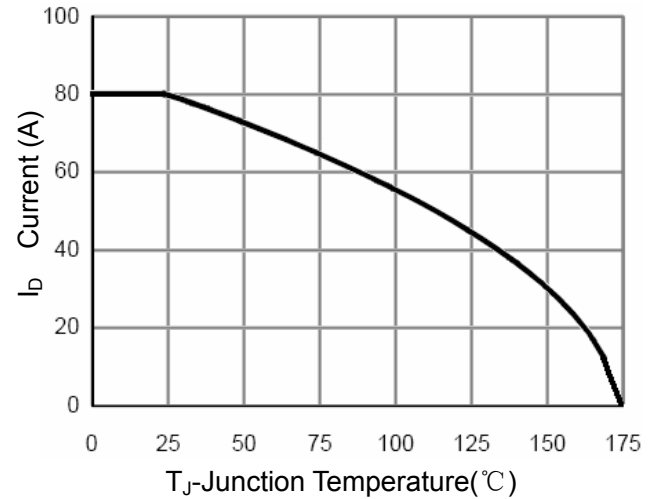


Figure 10 Id Current- Junction Temperature

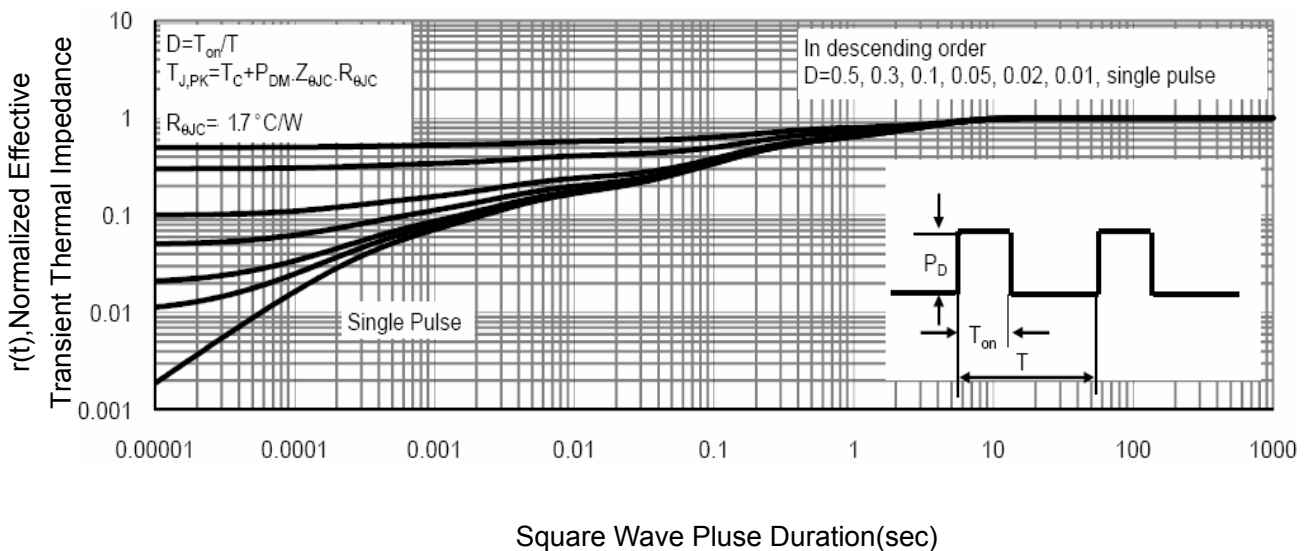
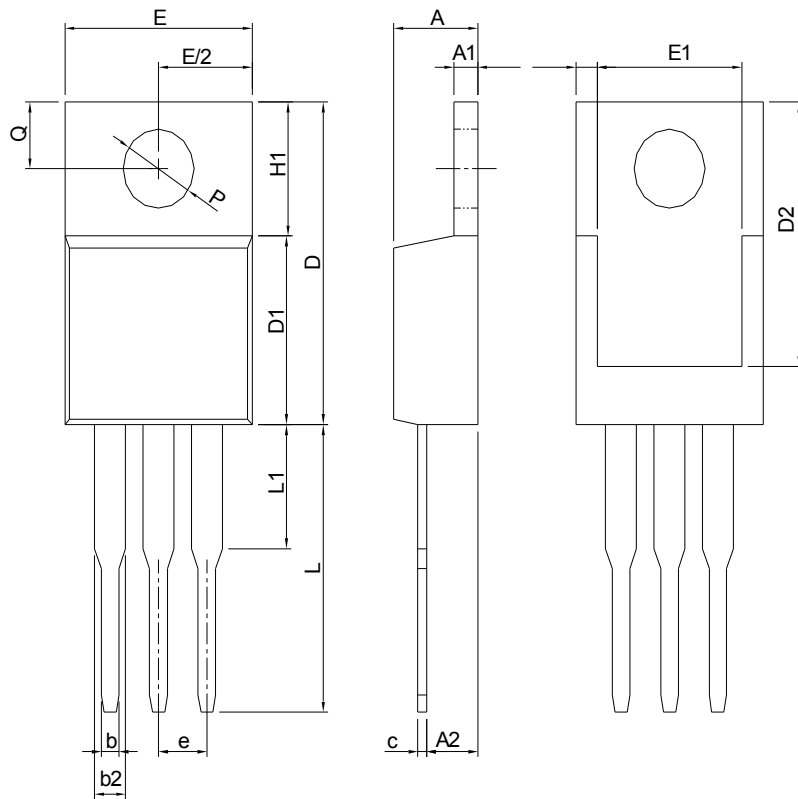


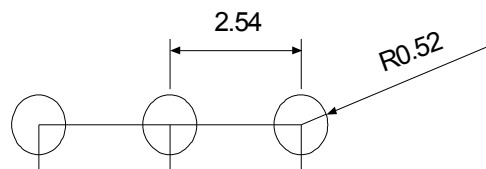
Figure 11 Normalized Maximum Transient Thermal Impedance

Package Information: TO-220AB



SYMBOL	TO-220			
	MILLIMETERS		INCHES	
	MIN.	MAX.	MIN.	MAX.
A	3.56	4.83	0.140	0.190
A1	0.51	1.40	0.020	0.055
A2	2.03	2.92	0.080	0.115
b	0.38	1.02	0.015	0.040
b2	1.14	1.78	0.045	0.070
c	0.36	0.61	0.014	0.024
D	14.22	16.51	0.560	0.650
D1	8.38	9.02	0.330	0.355
D2	12.19	13.65	0.480	0.537
E	9.65	10.67	0.380	0.420
E1	6.86	8.89	0.270	0.350
e	2.54 BSC		0.100 BSC	
H1	5.84	6.86	0.230	0.270
L	12.70	14.73	0.500	0.580
L1	-	6.35	-	0.250
P	3.53	4.09	0.139	0.161
Q	2.54	3.43	0.100	0.135

RECOMMENDED LAND PATTERN



UNIT: mm

Note: Follow JEDEC TO-220 AB.