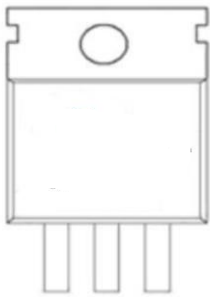# TM120N06P

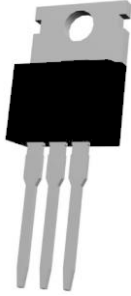## N-Channel Enhancement Mosfet

General Description
• Low R $_{DS(ON)}$
• RoHS and Halogen-Free Compliant

Applications
• Load switch
• PWM

General Features

V_{DS} = 60V I_D =120A

$R_{DS(ON)}$ =4.5mΩ(typ.)@ V_{GS}=10V
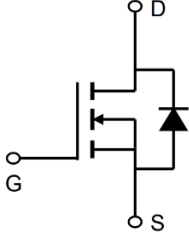
100% UIS Tested
100% R_g Tested

Green Product

P:TO-220AB

Marking: 120N06P

G D S

D

G

S

Absolute Maximum Ratings@T$_j$=25ºC(unless otherwise specified)

Symbol	Parameter	Ratings	Units
V_{DS}	Drain-Source Voltage	60	V
V_{GS}	Gate-Source Voltage	±20	V
I_D	Continuous Drain Current-T$_C$=25℃	120	A
	Continuous Drain Current-T$_C$=100℃	68	
I_{DM}	Pulsed Drain Current	340	
P_D	Power Dissipation	130	W
E_{AS}	Single pulse avalanche energy [Note 5]	380	℃
T_J, T_{STG}	Operating and Storage Junction Temperature Range	-55-+175	℃

Thermal Characteristics：

Symbol	Parameter	Max	Units
$R_{θJC}$	Thermal Resistance,Junction to Case [Note 2]	1.15	℃/W

Electrical Characteristics (T_A = 25°C Unless Otherwise Noted)

Symbol	Parameter	Conditions	Min	Typ	Max	Units
Off Characteristics						
BV_{DSS}	Drain-Sourtce Breakdown Voltage	V_{GS}=0V,I_D=250 μA	60		---	V
I_{DSS}	Zero Gate Voltage Drain Current	V_{GS}=0V, V_{DS}=60V	---	---	1	μA
I_{GSS}	Gate-Source Leakage Current	V_{GS}=±20V, V_{DS}=0A	---	---	±100	nA
On Characteristics[Note 3]						
$V_{GS(th)}$	GATE-Source Threshold Voltage	V_{GS}=V_{DS}, I_D=250 μA	2	3	4	V
$R_{DS(ON)}$	Drain-Source On Resistance	V_{GS}=10V,I_D=30A	---	4.5	6	mΩ
Dynamic Characteristics[Note 4]						
C_{iss}	Input Capacitance		---	4000	---	
C_{oss}	Output Capacitance	V_{DS}=25V, V_{GS}=0V, f=1MHz	---	350	--	pF
C_{rss}	Reverse Transfer Capacitance		---	300	---	
Switching Characteristics[Note 4]						
$t_{d(on)}$	Turn-On Delay Time		---	12	---	ns
t_r	Rise Time	V_{DS}=30V, R_G=3 Ω	---	10	---	ns
$t_{d(off)}$	Turn-Off Delay Time	V_{GS}=10V,R_L=1.5 Ω	---	21	---	ns
t_f	Fall Time		---	7	---	ns
Q_g	Total Gate Charge		---	32	---	nC
Q_{gs}	Gate-Source Charge	V_{GS}=10V, V_{DS}=30V, I_D=20A	---	11.2	---	nC
Q_{gd}	Gate-Drain "Miller" Charge		---	7.5	---	nC
Drain-Source Diode Characteristics						
I_S	Maximum Continuous Drain to Source Diode Forward Current [Note 2]		---	---	120	A
I_{SM}	Maximum Pulsed Drain to Source Diode Forward Current		---	---	340	A
V_{SD}	Diode Forward Voltage [Note 3]	V_{GS}=0V, I_{SD}=30A	---	---	1.2	V
T_{rr}	Reverse Recovery Time	I_F=20A,dI/dt=100A/us	---	18	---	NS
Q_{rr}	Reverse Recovery Charge		---	58	---	NC

Notes:

1. Repetitive Rating: Pulse width limited by maximum junction temperature.

2. Surface Mounted on FR4 Board, t ≤ 10 sec.

3. Pulse Test: Pulse Width ≤ 300μs, Duty Cycle ≤ 2%.

4. Guaranteed by design, not subject to production

5. E_{AS} condition:Tj=25℃,V_{DD}=30V,V_G=10V,L=0.5mH,Rg=25Ω

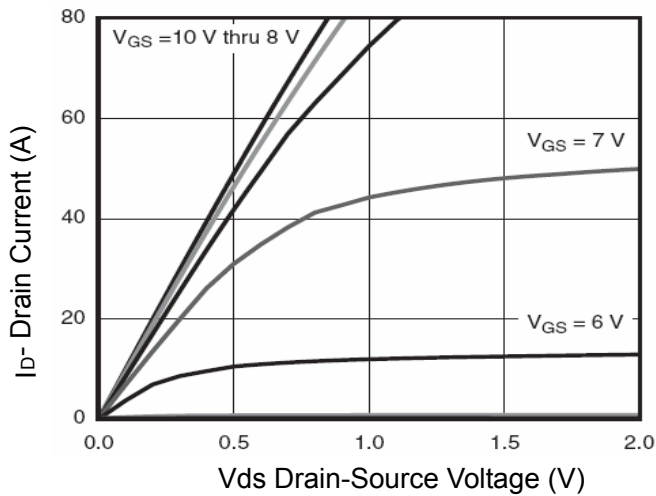## Typical Operating Characteristics
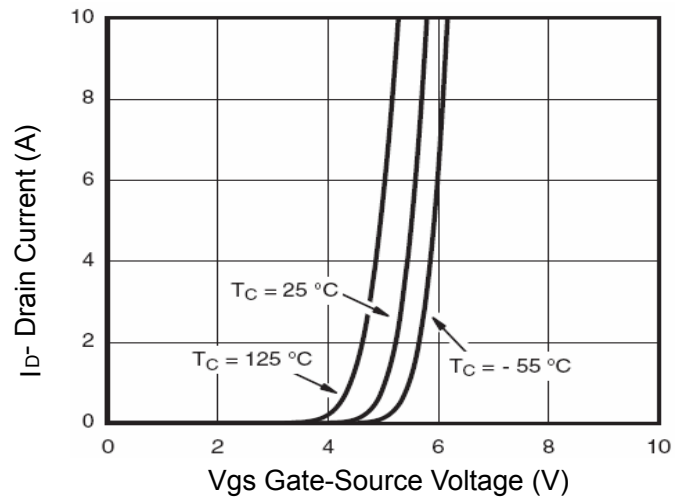

Figure 1 Output Characteristics

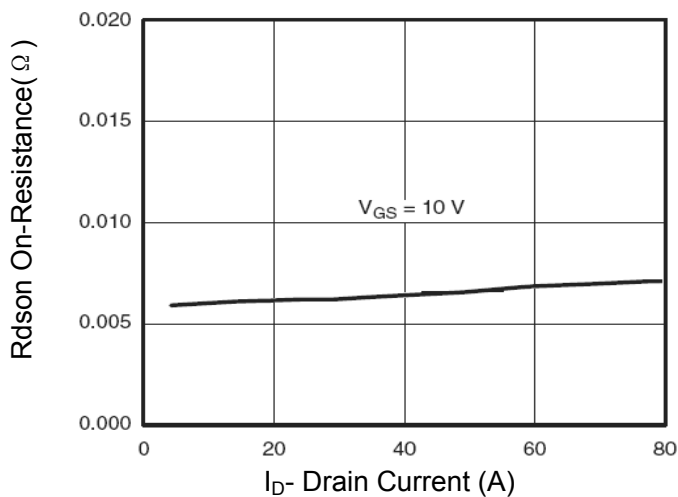**Figure 2 Transfer Characteristics**

Figure 3 Rdson- Drain Current
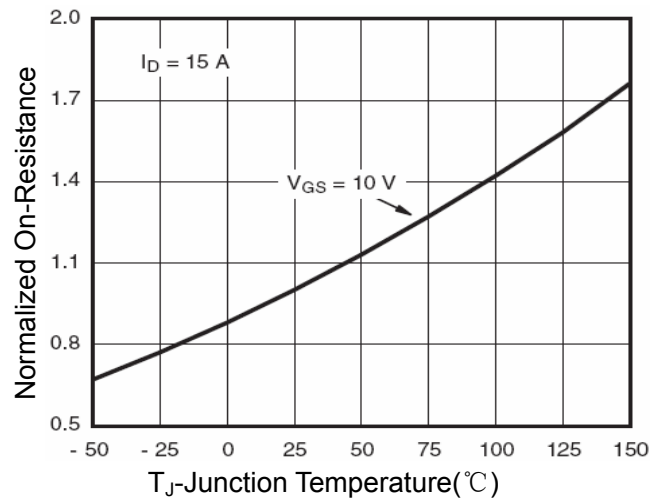
Figure 4 Rdson-JunctionTemperature
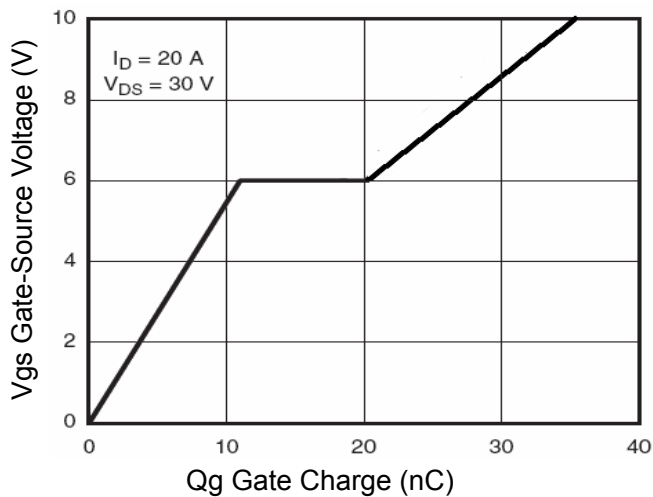
Figure 5 Gate Charge
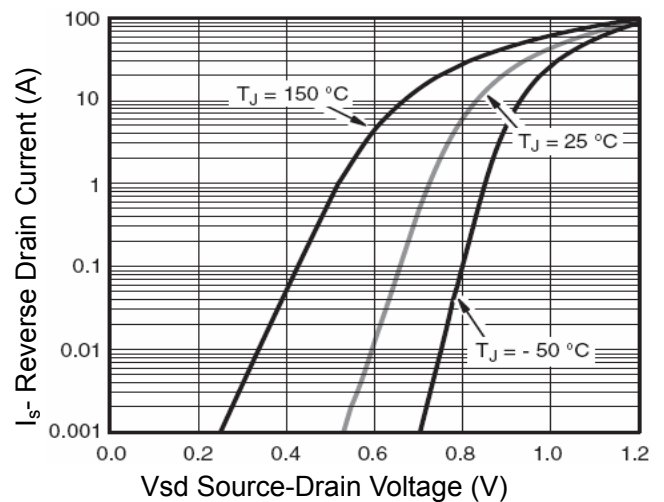
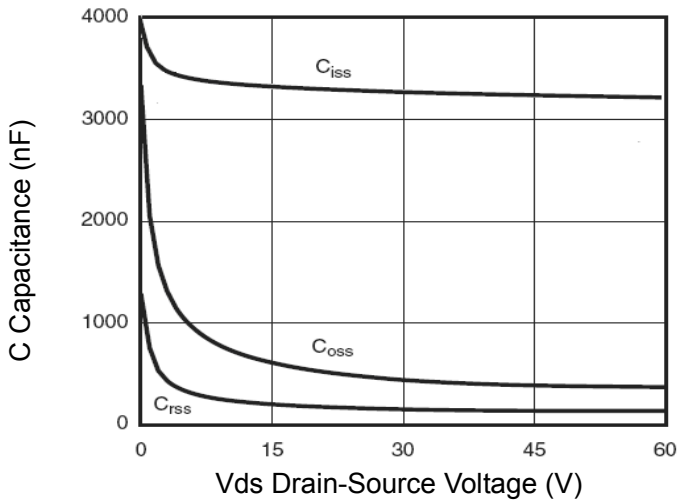**Figure 6 Source- Drain Diode Forward**
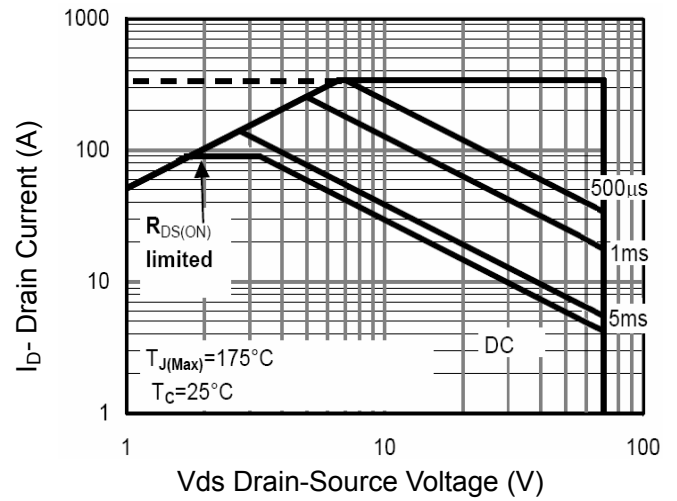
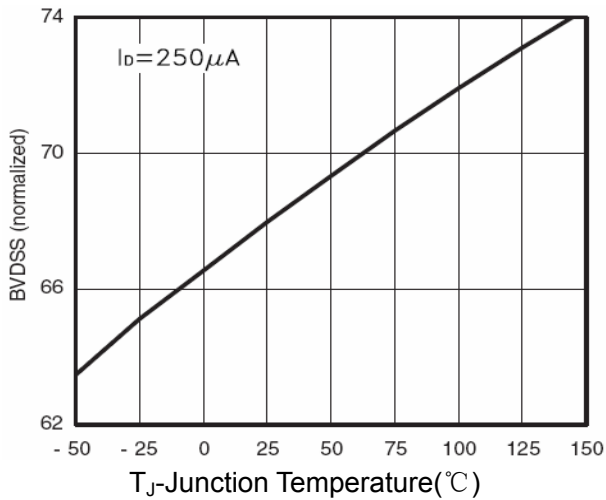**Figure 7 Capacitance vs Vds**

Figure 8 Safe Operation Area

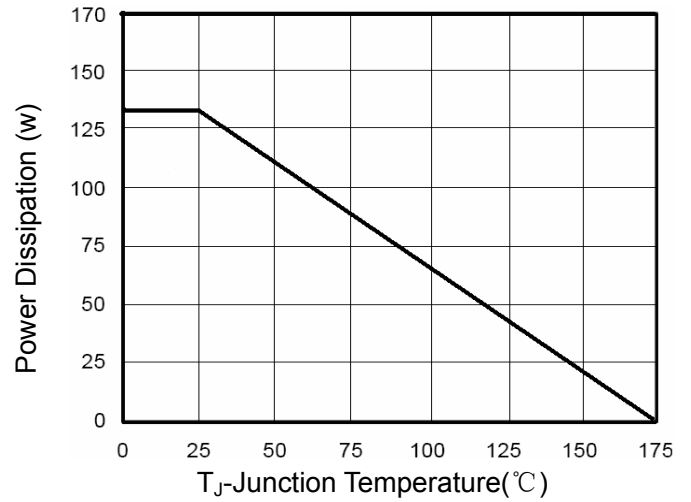**Figure 9 BV$_{DSS}$ vs Junction Temperature**

Figure 10 Power De-rating
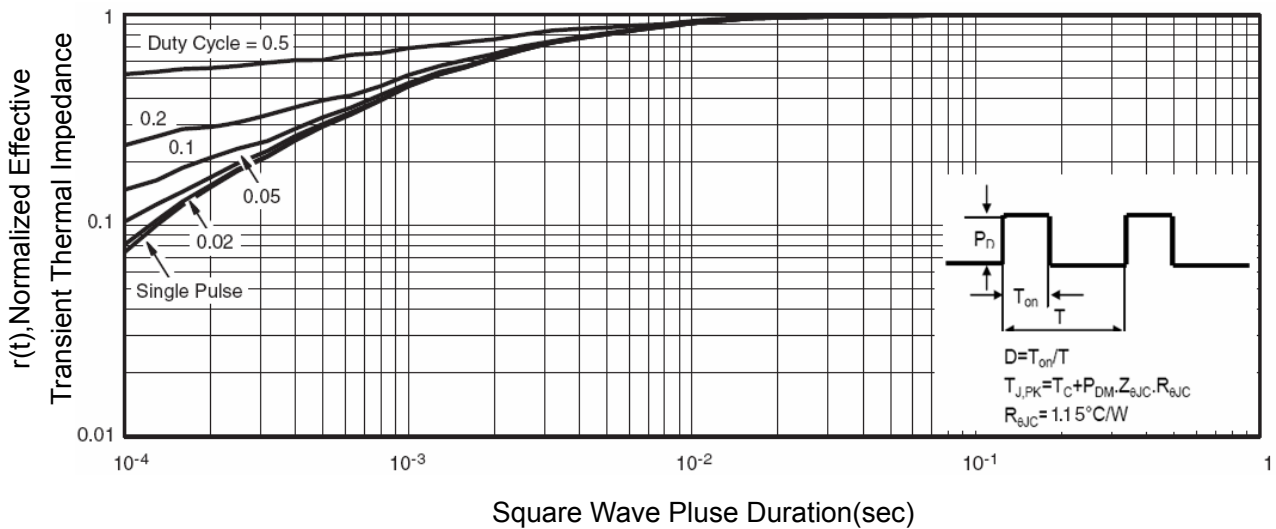
Figure 11 Normalized Maximum Transient Thermal Impedance
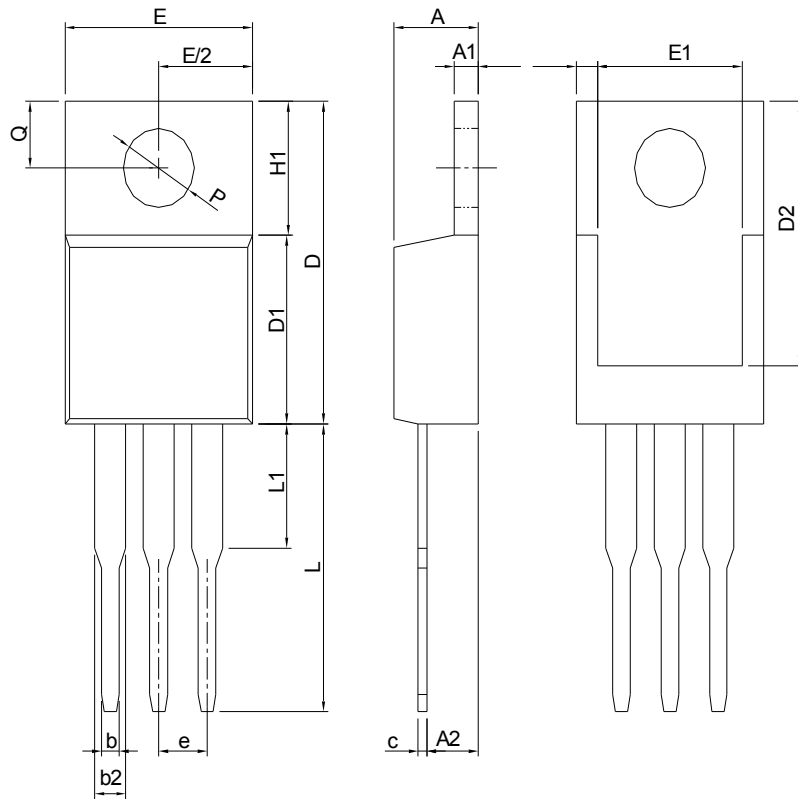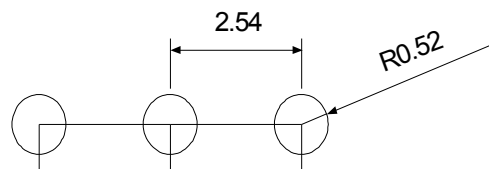
Package Information:TO-220AB

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

Note: Follow JEDEC TO-220 AB.

RECOMMENDED LAND PATTERN

UNIT: mm