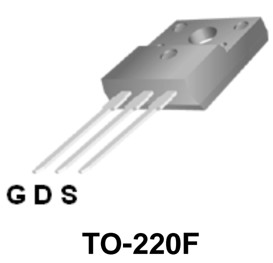
# P1070ETF

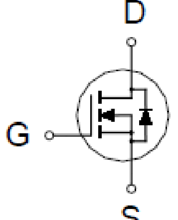
## N-Channel Enhancement Mode MOSFET

### PRODUCT SUMMARY

| $V_{(BR)DSS}$ | $R_{DS(ON)}$ | $I_D$ |
|---|---|---|
| 700V | 0.91mΩ @$V_{GS}$ = 10V | 10A |




TO-220F




**100% UIS tested**

### ABSOLUTE MAXIMUM RATINGS ($T_A$ = 25 °C Unless Otherwise Noted)

| PARAMETERS/TEST CONDITIONS | | SYMBOL | LIMITS | UNITS |
|---|---|---|---|---|
| Drain-Source Voltage | | $V_{DS}$ | 700 | V |
| Gate-Source Voltage | | $V_{GS}$ | ±30 | |
| Continuous Drain Current[2,4] | $T_C$ = 25 °C | $I_D$ | 10 | A |
| | $T_C$ = 100 °C | | 6 | |
| Pulsed Drain Current[1,2] | | $I_{DM}$ | 30 | |
| Avalanche Current[3] | | $I_{AS}$ | 5 | |
| Avalanche Energy[3] | | $E_{AS}$ | 125 | mJ |
| Power Dissipation | $T_C$ = 25 °C | $P_D$ | 46 | W |
| | $T_C$ = 100 °C | | 18 | |
| Operating Junction & Storage Temperature Range | | $T_j$, $T_{stg}$ | -55 to 150 | °C |

### THERMAL RESISTANCE RATINGS

| THERMAL RESISTANCE | SYMBOL | TYPICAL | MAXIMUM | UNITS |
|---|---|---|---|---|
| Junction-to-Case | $R_{\theta JC}$ | | 2.7 | °C / W |
| Junction-to-Ambient | $R_{\theta JA}$ | | 62.5 | |

[1]Pulse width limited by maximum junction temperature.

[2]Limited only by maximum temperature allowed.

[3]$V_{DD}$ = 50V , L = 10mH, starting $T_J$ = 25°C.

[4]This characteristics assumes the die are assembled in TO-220 packages.

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### ELECTRICAL CHARACTERISTICS ($T_J$ = 25 °C, Unless Otherwise Noted)

| PARAMETER | SYMBOL | TEST CONDITIONS | LIMITS | | | UNITS |
|---|---|---|---|---|---|---|
| | | | MIN | TYP | MAX | |
| **STATIC** | | | | | | |
| Drain-Source Breakdown Voltage | $V_{(BR)DSS}$ | $V_{GS}$ = 0V, $I_D$ = 250μA | 700 | | | V |
| Gate Threshold Voltage | $V_{GS(th)}$ | $V_{DS}$ = $V_{GS}$, $I_D$ = 250μA | 2 | 2.8 | 4 | V |
| Gate-Body Leakage | $I_{GSS}$ | $V_{DS}$ = 0V, $V_{GS}$ = ±30V | | | ±100 | nA |
| Gate Voltage Drain Current | $I_{DSS}$ | $V_{DS}$ = 700V, $V_{GS}$ = 0V , $T_C$ = 25 °C | | | 1 | μA |
| | | $V_{DS}$ = 560V, $V_{GS}$ = 0V , $T_C$ = 100 ° | | | 100 | |
| Drain-Source On-State Resistance[1] | $R_{DS(ON)}$ | $V_{GS}$ = 10V, $I_D$ = 5A | | 0.77 | 0.91 | mΩ |
| Forward Transconductance[1] | $g_{fs}$ | $V_{DS}$ = 10V, $I_D$ = 5A | | 13 | | S |
| **DYNAMIC** | | | | | | |
| Input Capacitance | $C_{iss}$ | $V_{GS}$ = 0V, $V_{DS}$ = 25V, f = 1MHz | | 2039 | | pF |
| Output Capacitance | $C_{oss}$ | | | 154 | | |
| Reverse Transfer Capacitance | $C_{rss}$ | | | 8 | | |
| Gate Resistance | $R_g$ | $V_{GS}$ = 0V, $V_{DS}$ = 0V, f = 1MHz | | 1.4 | | Ω |
| Total Gate Charge[2] | $Q_g$ | $V_{DD}$ = 560V, $I_D$ = 10A, $V_{GS}$ = 10V | | 43 | | nC |
| Gate-Source Charge[2] | $Q_{gs}$ | | | 8.4 | | |
| Gate-Drain Charge[2] | $Q_{gd}$ | | | 11 | | |
| Turn-On Delay Time[2] | $t_{d(on)}$ | $V_{DD}$ = 350V, $I_D$ = 10A, $R_G$= 25Ω | | 38 | | nS |
| Rise Time[2] | $t_r$ | | | 41 | | |
| Turn-Off Delay Time[2] | $t_{d(off)}$ | | | 141 | | |
| Fall Time[2] | $t_f$ | | | 73 | | |
| **SOURCE-DRAIN DIODE RATINGS AND CHARACTERISTICS ($T_J$ = 25 °C)** | | | | | | |
| Continuous Current[3] | $I_S$ | | | | 10 | A |
| Forward Voltage[1] | $V_{SD}$ | $I_F$ = 10A, $V_{GS}$ = 0V | | | 1.4 | V |
| Reverse Recovery Time | $t_{rr}$ | $I_F$ = 10A , $dI_F/dt$= 100A/μs | | 423 | | nS |
| Reverse Recovery Charge | $Q_{rr}$ | | | 5.8 | | uC |

[1]Pulse test : Pulse Width ≤ 380 μsec, Duty Cycle ≤ 2%.

[2]Independent of operating temperature.

[3]Pulse width limited by maximum junction temperature.

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### Output Characteristics

ID, Drain-To-Source Current(A)

VGS=10V
VGS=9V
VGS=8V
VGS=7V
VGS=6V
VGS=5V
VGS=4.5V
VGS=4.2V
VGS=4V

VDS, Drain-To-Source Voltage(V)

### Transfer Characteristics

ID, Drain-To-Source Current(A)

25℃
125℃
-20℃

VGS, Gate-To-Source Voltage(V)

### On-Resistance VS Gate-To-Source

RDS(ON)ON-Resistance(OHM)

ID=5A

VGS, Gate-To-Source Voltage(V)

### On-Resistance VS Drain Current

RDS(ON)ON-Resistance(OHM)

VGS=10V

ID , Drain-To-Source Current(A)

### On-Resistance VS Temperature

Normalized Drain to Source
ON-Resistance

VGS=10V
ID=5A

TJ , Junction Temperature(°C)

### Capacitance Characteristic

C , Capacitance(pF)

CISS
COSS
CRSS

VDS, Drain-To-Source Voltage(V)

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## N-Channel Enhancement Mode MOSFET

### Gate charge Characteristics

VDS=560V
ID=10A

$V_{GS}$ , Gate-To-Source Voltage(V)

Qg , Total Gate Charge(nC)

### Source-Drain Diode Forward Voltage

150℃
25℃

$I_S$ , Source Current(A)

$V_{SD}$, Source-To-Drain Voltage(V)

### Safe Operating Area

Operation in This Area is Limited by RDS(ON)

1ms
10ms
100ms
DC

NOTE :
1.VGS= 10V
2.TC=25°C
3.RθJC = 2.7 °C/W
4.Single Pulse

$I_D$ , Drain Current(A)

$V_{DS}$, Drain-To-Source Voltage(V)

### Single Pulse Maximum Power Dissipation

Single Pulse
RθJC = 2.7 °C/W
TC=25°C

Power(W)

Single Pulse Time(s)

### Transient Thermal Response Curve

Duty cycle=0.5
0.2
0.1
0.05
0.02
0.01
single pulse

Notes
1.Duty cycle, D= t1 / t2
2.RthJC = 2.7 ℃/W
3.TJ-TC = P*RthJC(t)
4.RthJC(t) = r(t)*RthJC

r(t) , Normalized Effective Transient Thermal Resistance

$T_1$ , Square Wave Pulse Duration[sec]

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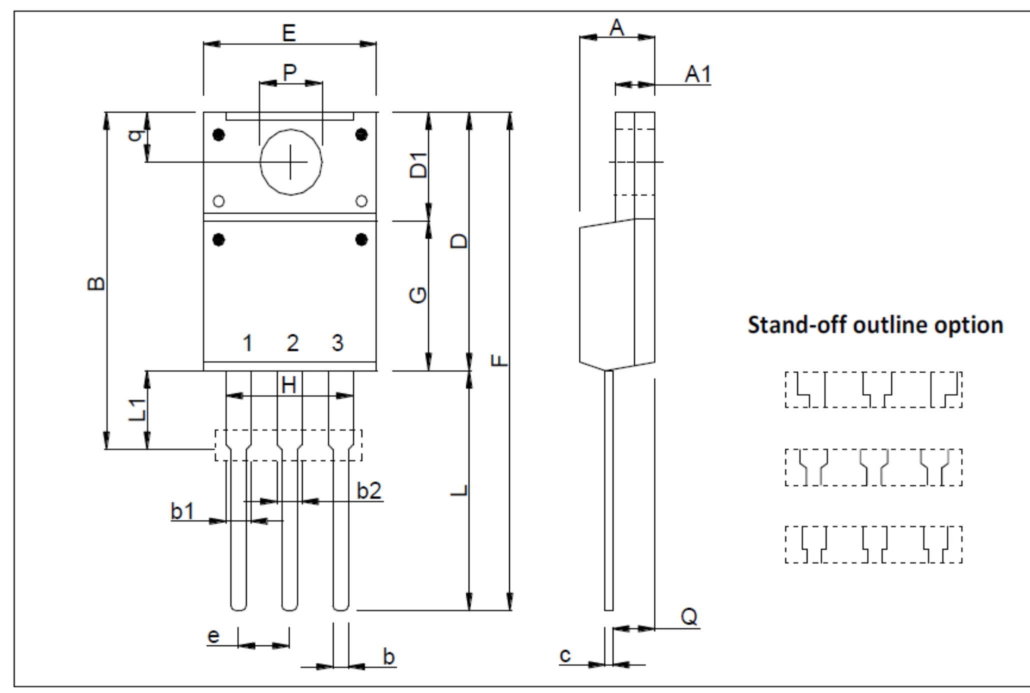
## N-Channel Enhancement Mode MOSFET

### Package Dimension

## TO-220F (3-Lead) MECHANICAL DATA

| Dimension | mm | | | Dimension | mm | | |
|---|---|---|---|---|---|---|---|
| | Min. | Typ. | Max. | | Min. | Typ. | Max. |
| A | 4.4 | | 4.93 | e | 2.34 | | 2.74 |
| A1 | 2.34 | | 3.1 | F | 27.2 | | 30.6 |
| B | 18.8 | | 20 | G | 7.7 | | 9.39 |
| b | 0.65 | | 1 | H | 6.18 | | 6.82 |
| b1 | 0.93 | | 1.6 | L | 12.7 | | 14.2 |
| b2 | 0.95 | | 1.6 | L1 | 2.88 | | 3.7 |
| c | 0.4 | | 1 | P | 2.98 | | 3.7 |
| D | 13.5 | | 16.4 | Q | 2.3 | | 2.96 |
| D1 | 6.48 | | 6.95 | q | 3.1 | | 3.8 |
| E | 9.8 | | 10.4 | | | | |




*因各家封装模具不同而外观略有所差异，不影响电性及Layout。

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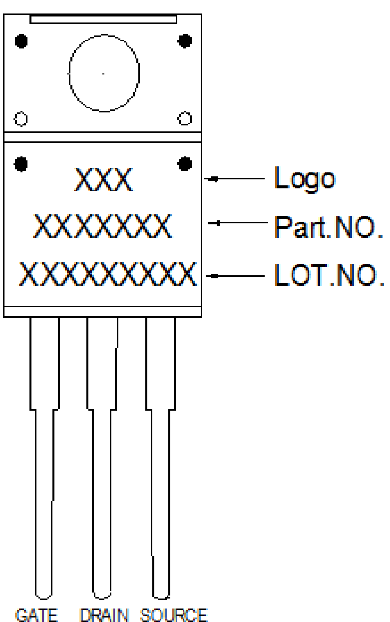
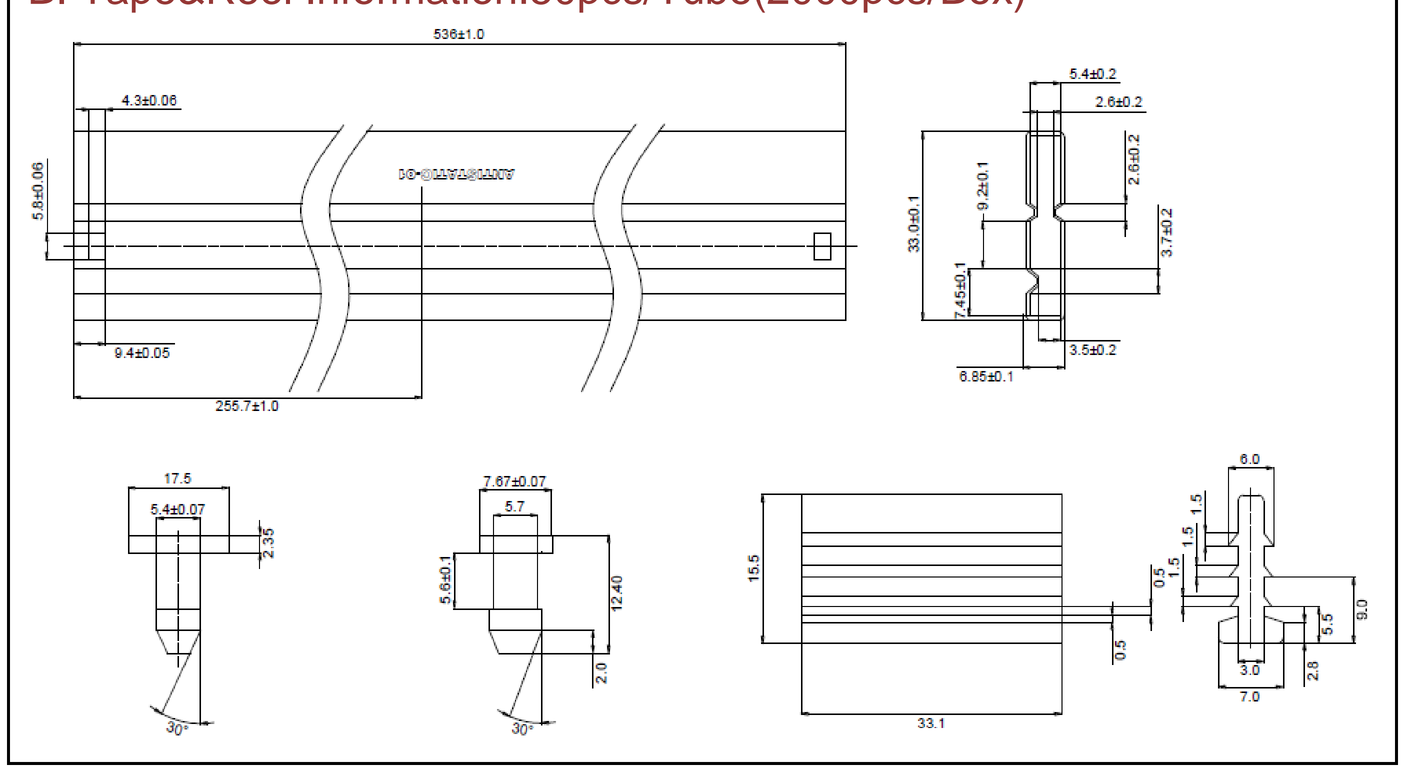
**N-Channel Enhancement Mode MOSFET**

## A. Marking Information




## B. Tape&Reel Information:50pcs/Tube(2000pcs/Box)



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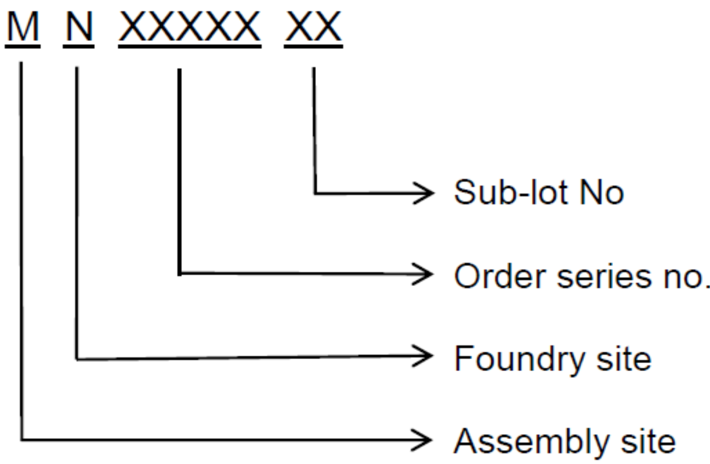
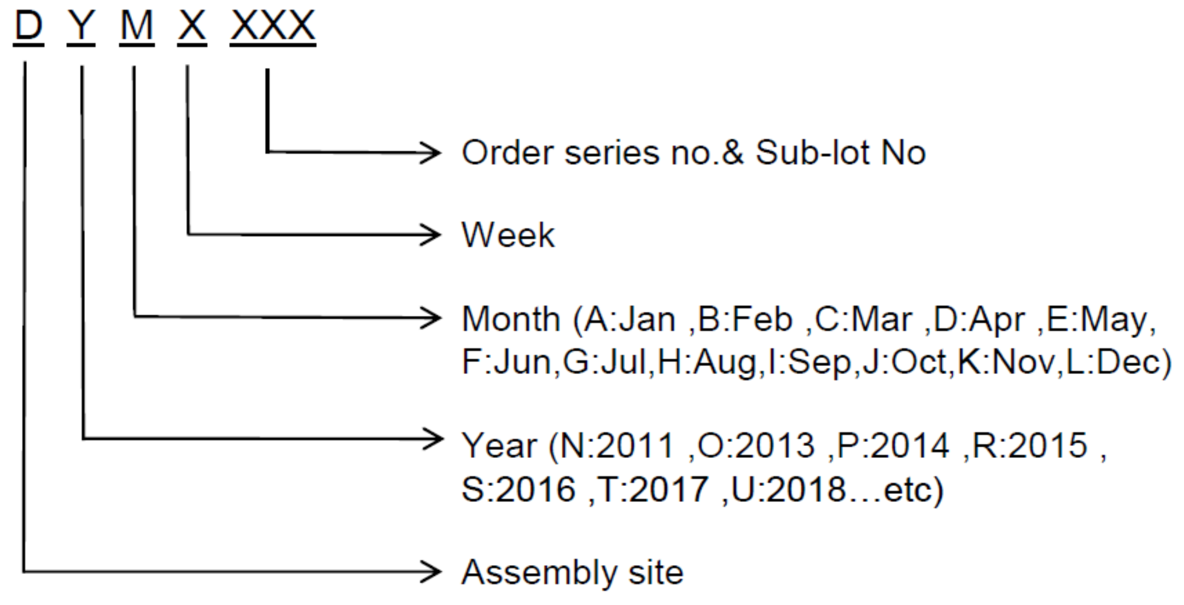
## N-Channel Enhancement Mode MOSFET

## C. Lot No.&Date Code rule

### 1.Lot No.




### 2.Date Code



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## N-Channel Enhancement Mode MOSFET

## D.Label rule

标签内容(Label content)

| 1 | Label Size | 30 * 90 mm |
|---|---|---|
| 2 | Font style | Times New Roman or Arial<br>(或可区分英文”0”和数字”0”，”G和”Q”的字型即可) |
| 3 | U-NIKC | Height: 4 mm |
| 4 | Package | Height: 2 mm |
| 5 | Date | Height: 2 mm Shipping date: YYYY/MM/DD, ex. 2008/09/12 |
| 6 | Device | Height: 3 mm (Max: 16 Digit) |
| 7 | Lot | Height: 3 mm (Max: 9 Digit) Sub lot |
| 8 | D/C | Height: 3 mm (Max: 7 Digit) |
| 9 | QTY | Height: 3 mm (Max: 6 Digit) Thousand mark is no needed |
| 10 | RoHS label | RoHS long axis: 12 mm minor axis:6 mm<br>bottom color: White<br>Font color: Black Font style: Arial |
| 11 | Halogen Free label | G Diameter: 10 mm bottom color: Green<br>Font color: Black Font style: Arial |
| 12 | Scan information | Device / Lot / D/C / QTY , Insert “ / “ between every parts.<br>for example: P3055LDG/G12345601/GGG2301/2000<br>DPI (Dots per inch): Over 300 dpi<br>Code : Code 128<br>Height: 6 mm at least |