**YEA SHIN TECHNOLOGY CO., LTD** YS35N06AP

# N-Channel Enhancement MOSFET

**VDS= 60V, ID= 50A**

**TO-220**

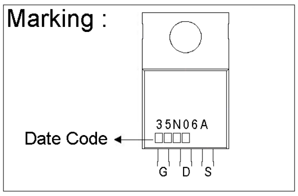

## DESCRIPTION

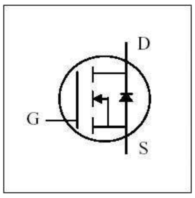
The YS35N06AP is using trench DMOS technology. This advanced technology has been especially tailored to minimize $R_{DS(ON)}$ provide superior switching performance, and withstand high energy pulse in the avalanche and commutation mode. These devices are well suited for high efficiency fast switching applications.

The YS35N06AP meet the RoHS and Green Product requirement, 100% EAS guaranteed with full function reliability approved.

## FEATURES

- Low On-Resistance
- Improved dv/dt Capability
- Green Device Available
- Fast Switching
- 100% EAS Guaranteed




## Absolute Maximum Ratings

| Parameter | Symbol | Ratings | Unit |
|---|---|---|---|
| Drain-Source Voltage | $V_{DS}$ | 60 | V |
| Gate-Source Voltage | $V_{GS}$ | ±20 | V |
| Continuous Drain Current[1] | $I_D$ @$T_C$=25℃ | 50 | A |
| | $I_D$ @$T_C$=100℃ | 32 | A |
| Pulsed Drain Current[1,2] | $I_{DM}$ | 200 | A |
| Total Power Dissipation[4] | $P_D$ @$T_C$=25℃ | 104 | W |
| | $P_D$ @$T_A$=25℃ | 2 | W |
| Single Pulse Avalanche Energy, L=0.1mH[3] | $E_{AS}$ | 42 | mJ |
| Single Pulse Avalanche Current, L=0.1mH[3] | $I_{AS}$ | 29 | A |
| Operating Junction and Storage Temperature Range | $T_J$, $T_{STG}$ | -50 ~ +150 | ℃ |

## Thermal Data

| Parameter | Symbol | Conditions | Max. Value | Unit |
|---|---|---|---|---|
| Thermal Resistance Junction-ambient[1] | $R_{\theta JA}$ | Steady State | 62.5 | ℃/W |
| Thermal Resistance Junction-case[1] | $R_{\theta JC}$ | Steady State | 1.2 | ℃/W |

# DEVICE CHARACTERISTICS

## YS35N06AP

### Electrical Characteristics (Tj = 25℃ unless otherwise specified)

| Parameter | Symbol | Min. | Typ. | Max. | Unit | Test Conditions |
|---|---|---|---|---|---|---|
| Drain-Source Breakdown Voltage | $BV_{DSS}$ | 60 | - | - | V | $V_{GS}$=0, $I_D$=250uA |
| Gate Threshold Voltage | $V_{GS(th)}$ | 1.2 | 1.8 | 2.5 | V | $V_{DS}$=$V_{GS}$, $I_D$=250uA |
| Forward Transconductance | $g_{fs}$ | - | 9 | - | S | $V_{DS}$=10V, $I_D$=10A |
| Gate-Source Leakage Current | $I_{GSS}$ | - | - | ±100 | nA | $V_{GS}$= ±20V |
| Drain-Source Leakage Current(Tj=25℃) | $I_{DSS}$ | - | - | 1 | uA | $V_{DS}$=60V, $V_{GS}$=0 |
| Drain-Source Leakage Current(Tj=125℃) | | - | - | 10 | uA | $V_{DS}$=48V, $V_{GS}$=0 |
| Static Drain-Source On-Resistance | $R_{DS(ON)}$ | - | 17 | 21 | mΩ | $V_{GS}$=10V, $I_D$=20A |
| | | - | 20 | 24 | | $V_{GS}$=4.5V, $I_D$=12A |
| Total Gate Charge[2] | $Q_g$ | - | 28 | - | nC | $I_D$=15A<br>$V_{DS}$=30V<br>$V_{GS}$=10V |
| Gate-Source Charge | $Q_{gs}$ | - | 3.5 | - | | |
| Gate-Drain ("Miller") Change | $Q_{gd}$ | - | 6.5 | - | | |
| Turn-on Delay Time[2] | $T_{d(on)}$ | - | 7.2 | - | ns | $V_{DS}$=30V<br>$I_D$=1A<br>$V_{GS}$=10V<br>$R_G$=6Ω |
| Rise Time | $T_r$ | - | 38 | - | | |
| Turn-off Delay Time | $T_{d(off)}$ | - | 34 | - | | |
| Fall Time | $T_f$ | - | 8.2 | - | | |
| Input Capacitance | $C_{iss}$ | - | 1680 | - | pF | $V_{GS}$=0V<br>$V_{DS}$=20V<br>f=1.0MHz |
| Output Capacitance | $C_{oss}$ | - | 115 | - | | |
| Reverse Transfer Capacitance | $C_{rss}$ | - | 85 | - | | |
| Gate Resistance | $R_g$ | - | 2.2 | - | Ω | $V_{GS}$=0V, $V_{GS}$=0V, f=1MHz |

### Guaranteed Avalanche Characteristics

| Parameter | Symbol | Min. | Typ. | Max. | Unit | Test Conditions |
|---|---|---|---|---|---|---|
| Single Pulse Avalanche Energy[5] | EAS | 11.2 | - | - | mJ | $V_{DD}$=25V, L=0.1mH, $I_{AS}$=15A |

### Source-Drain Diode

| Parameter | Symbol | Min. | Typ. | Max. | Unit | Test Conditions |
|---|---|---|---|---|---|---|
| Diode Forward Voltage[2] | $V_{SD}$ | - | 0.7 | 1.0 | V | $I_S$=1A, $V_{GS}$=0V |
| Continuous Source Current[1,6] | $I_S$ | - | - | 50 | A | --- |

Notes: **1. The data tested by surface mounted on a 1 inch$^2$ FR-4 board with 2OZ copper.**

**2. The data tested by pulsed, pulse width ≦ 300us, duty cycle ≦ 2%.**

**3. The EAS data shows Max. rating. The test condition is VDD=25V, VGS=10V, L=0.1mH, IAS=29A.**

**4. The power dissipation is limited by 150℃ junction temperature.**

**5. The Min. value is 100% EAS tested guarantee.**

**6. The data is theoretically the same as ID and IDM, in real applications, should be limited by total power dissipation.**

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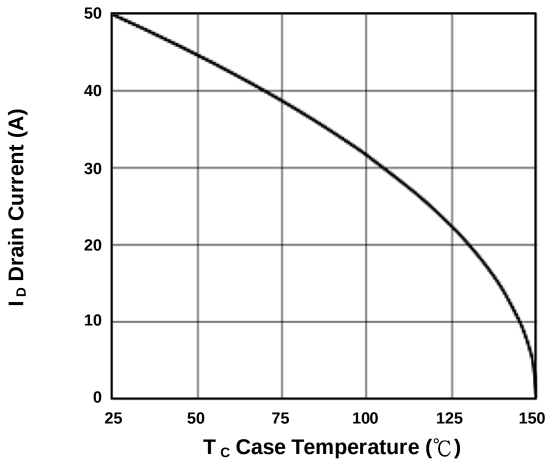



Fig.1 Drain Current vs. $T_C$

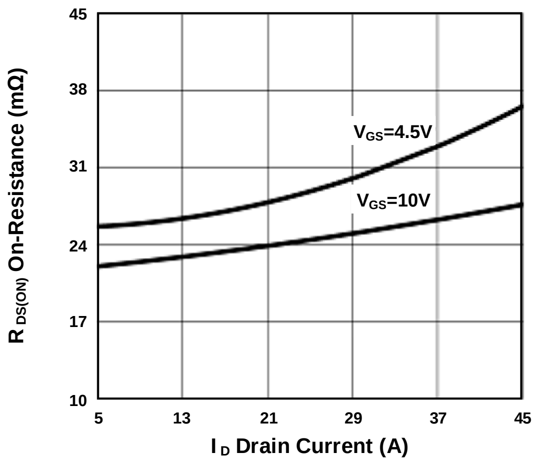



Fig.2 On-Resistance vs. Drain Current

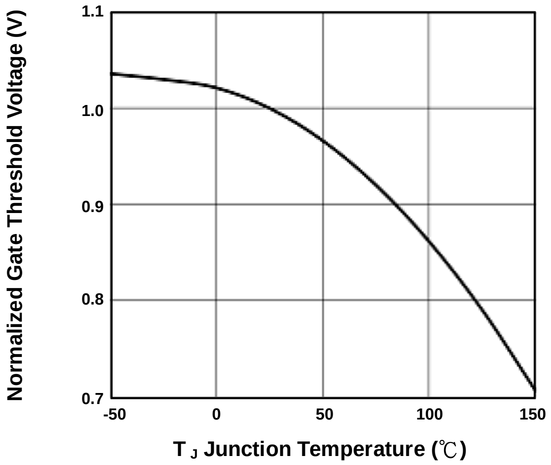



Fig.3 Normalized $V_{GS(th)}$ vs. $T_J$

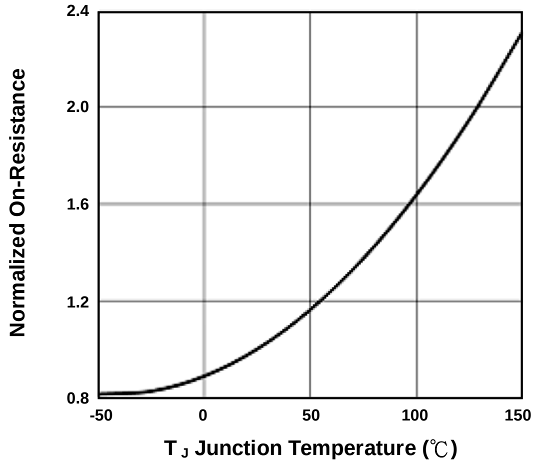



Fig.4 Normalized $R_{DSON}$ vs. $T_J$

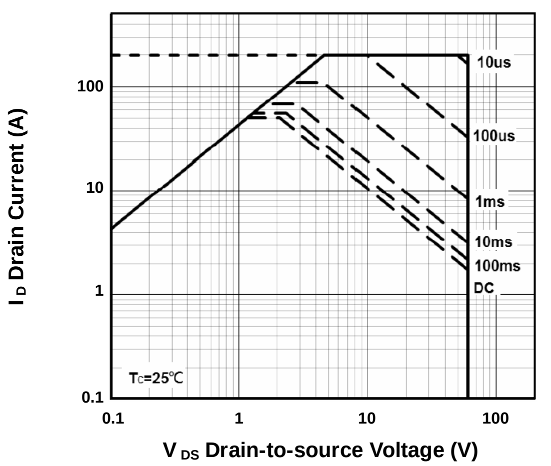



Fig.5 Safe Operating Area

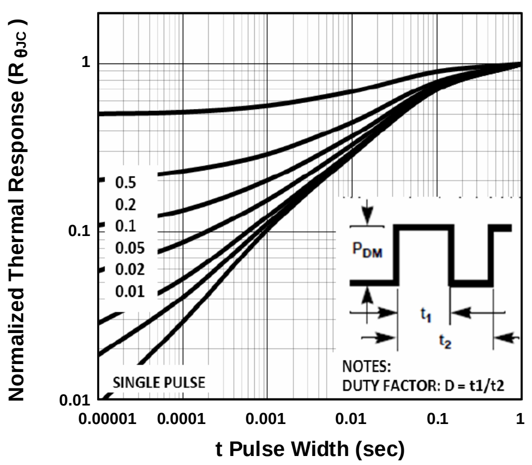



Fig.6 Transient Thermal Impedance

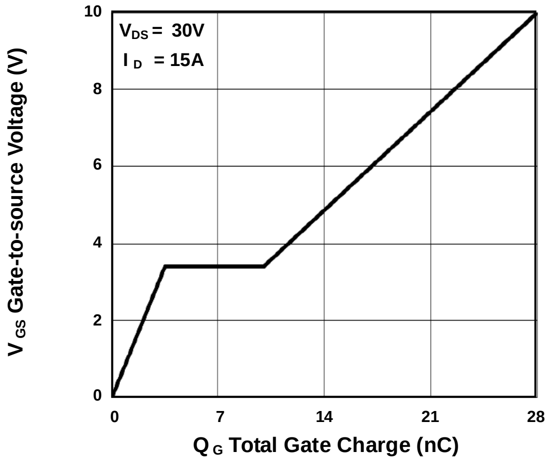



Fig.7 Gate Charge Characteristics

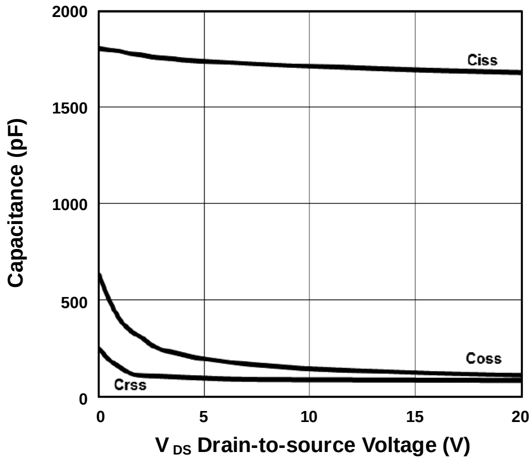



Fig.8 Capacitance Characteristics

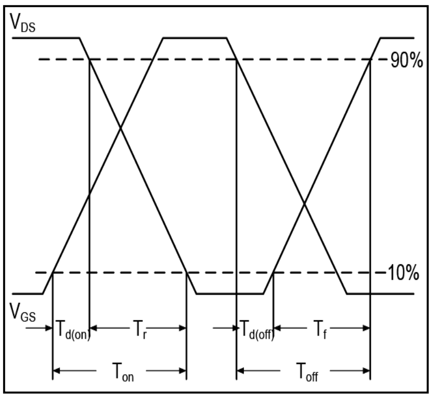



Fig.9 Switching Time Waveform

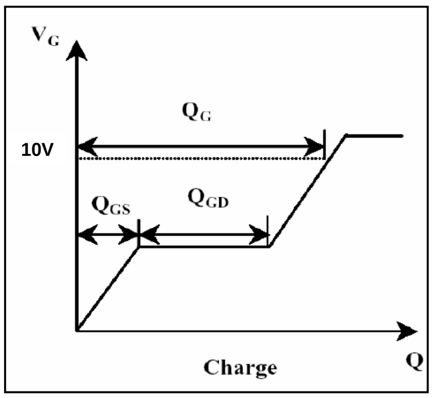
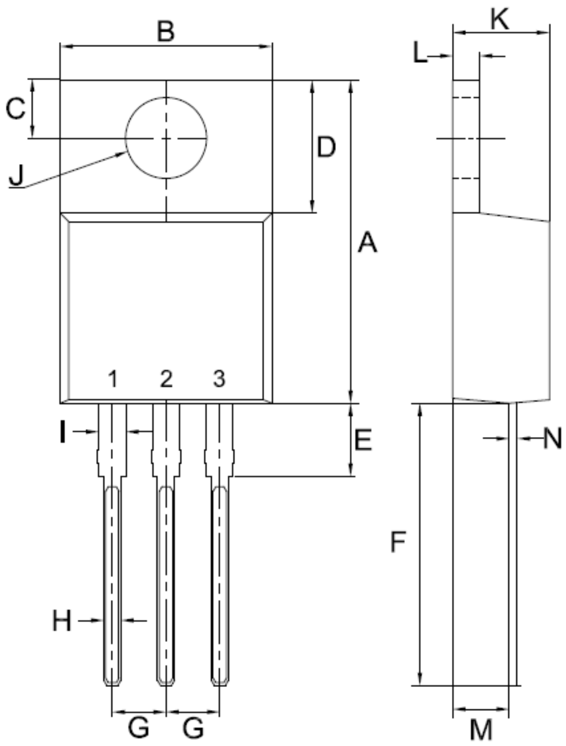



Fig.10 Gate Charge Waveform

# PACKAGE OUTLINE & DIMENSIONS

YS35N06AP

## TO-220 Mechanical Drawing




| | TO-220 Unit : mm | |
|---|---|---|
| | min | max |
| A | 14.5 | 16.2 |
| B | 9.5 | 10.57 |
| C | 2.54 | 3 |
| D | 5.8 | 7.3 |
| E | 2.95 | 4.5 |
| F | 12.7 | 14 |
| G | 2.34 | 2.75 |
| H | 0.3 | 1.11 |
| I | 0.9 | 1.75 |
| J | 3.2 | 4.14 |
| K | 4.24 | 4.87 |
| L | 1 | 1.5 |
| M | 1.09 | 2.92 |
| N | 0.3 | 0.68 |