Brückewell

# MS30N06X

**N-CHANNEL ENHANCEMENT MODE POWER MOSFET**

| | |
|---|---|
| BVDSS | 30V |
| RDS(ON) | 4.5mΩ |
| ID | 40A |

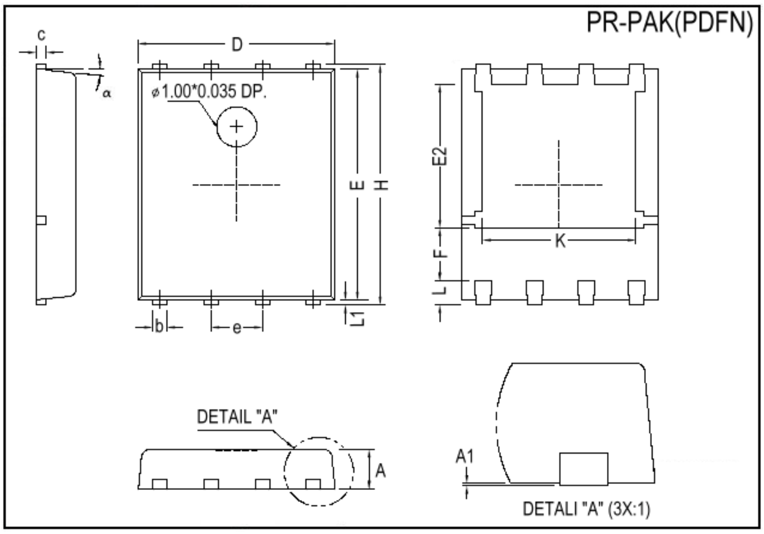
## Description

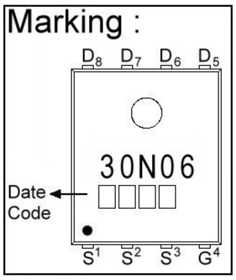
The MS30N06X uses advanced Trench technology and designs to provide excellent $R_{DS(ON)}$ with low gate charge. This device is suitable for use in PWM, load switching and general purpose applications. The GPR30N06 meet the RoHS and Green Product requirement, 100% EAS and Rg guaranteed with full function reliability approved.

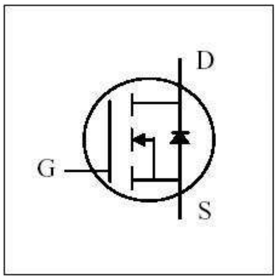
## Features

- Low On-Resistance
- Low Miller Charge
- Low Input Capacitance
- 100% EAS and Rg Guaranteed
- Green Device Available

## Package Dimensions




| REF. | Millimeter | | | REF. | Millimeter | | |
|---|---|---|---|---|---|---|---|
| | Min. | Nom. | Max. | | Min. | Nom. | Max. |
| A | 0.85 | 1.00 | 1.15 | E | 5.70 | - | 5.90 |
| A1 | 0.00 | - | 0.10 | e | - | 1.27 | - |
| b | 0.30 | - | 0.51 | H | 5.90 | - | 6.20 |
| c | 0.20 | - | 0.30 | L | - | 0.60 | - |
| D | 4.80 | - | 5.00 | L1 | 0.06 | - | 0.20 |
| F | 1.10REF. | | | $\alpha$ | 0° | - | 12° |
| E2 | 3.50REF. | | | K | 3.70 | 3.90 | 4.10 |

## Absolute Maximum Ratings

| Parameter | Symbol | Ratings | Unit |
|---|---|---|---|
| Drain-Source Voltage | $V_{DS}$ | 30 | V |
| Gate-Source Voltage | $V_{GS}$ | ±20 | V |
| Continuous Drain Current | $I_D$ @$T_C$=25℃ | 40 | A |
| | $I_D$ @$T_C$=70℃ | 40 | A |
| Pulsed Drain Current[1] | $I_{DM}$ | 100 | A |
| Continuous Drain Current | $I_D$ @$T_A$=25℃ | 31 | A |
| | $I_D$ @$T_A$=70℃ | 25 | A |
| Total Power Dissipation | $P_D$ @$T_C$=25℃ | 36 | W |
| | $P_D$ @$T_A$=25℃ | 4.2 | W |
| Single Pulse Avalanche Energy, L=0.1mH | $E_{AS}$ | 72 | mJ |
| Single Pulse Avalanche Current, L=0.1mH | $I_{AS}$ | 38 | A |
| Operating Junction and Storage Temperature Range | $T_J$, $T_{STG}$ | -55 ~ +150 | ℃ |

## Thermal Data

| Parameter | Symbol | Conditions | Max. Value | Unit |
|---|---|---|---|---|
| Thermal Resistance Junction-ambient[2] | $R_{\theta JA}$ | Steady State | 30 | ℃/W |
| Thermal Resistance Junction-case[2] | $R_{\theta JC}$ | Steady State | 3.5 | ℃/W |

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## Electrical Characteristics ($T_J$ = 25℃ unless otherwise specified)

| Parameter | Symbol | Min. | Typ. | Max. | Unit | Test Conditions |
|---|---|---|---|---|---|---|
| Drain-Source Breakdown Voltage | $BV_{DSS}$ | 30 | - | - | V | $V_{GS}$=0, $I_D$=250uA |
| Gate Threshold Voltage | $V_{GS(th)}$ | 1.15 | - | 2.2 | V | $V_{DS}$=$V_{GS}$, $I_D$=250uA |
| Forward Transconductance[1] | $g_{fs}$ | - | 82 | - | S | $V_{DS}$=15V, $I_D$=19A |
| Gate-Source Leakage Current | $I_{GSS}$ | - | - | ±100 | nA | $V_{GS}$= ±20V |
| Drain-Source Leakage Current | $I_{DSS}$ | - | - | 1 | uA | $V_{DS}$=30V, $V_{GS}$=0 |
| Static Drain-Source On-Resistance[1] | $R_{DS(ON)}$ | - | 3.3 | 4.5 | mΩ | $V_{GS}$=10V, $I_D$=19A |
| | | - | 4.6 | 5.6 | | $V_{GS}$=4.5V, $I_D$=16A |
| Total Gate Charge[1] | $Q_g$ | - | 12 | - | nC | $I_D$=19A<br>$V_{DS}$=15V<br>$V_{GS}$=4.5V |
| Gate-Source Charge | $Q_{gs}$ | - | 6 | - | | |
| Gate-Drain ("Miller") Change | $Q_{gd}$ | - | 5 | - | | |
| Turn-on Delay Time[1] | $T_{d(on)}$ | - | 24 | - | ns | $V_{DS}$=15V<br>$I_D$=10A<br>$V_{GS}$=4.5V<br>$R_G$=1.0Ω<br>$R_L$=1.5Ω |
| Rise Time | $T_r$ | - | 21 | - | | |
| Turn-off Delay Time | $T_{d(off)}$ | - | 25 | - | | |
| Fall Time | $T_f$ | - | 17 | - | | |
| Input Capacitance | $C_{iss}$ | - | 1750 | - | pF | $V_{GS}$=0V<br>$V_{DS}$=15V<br>f=1.0MHz |
| Output Capacitance | $C_{oss}$ | - | 360 | - | | |
| Reverse Transfer Capacitance | $C_{rss}$ | - | 150 | - | | |
| Gate Resistance | $R_g$ | - | 3.2 | 5.0 | Ω | f=1.0MHz |

## Guaranteed Avalanche Characteristics

| Parameter | Symbol | Min. | Typ. | Max. | Unit | Test Conditions |
|---|---|---|---|---|---|---|
| Single Pulse Avalanche Energy[3] | EAS | 48 | - | - | mJ | $V_{DD}$=20V, L=0.1mH, $I_{AS}$=31A |

## Source-Drain Diode

| Parameter | Symbol | Min. | Typ. | Max. | Unit | Test Conditions |
|---|---|---|---|---|---|---|
| Diode Forward Voltage[1] | $V_{SD}$ | - | 0.8 | 1.2 | V | $I_S$=10A, $V_{GS}$=0V |
| Continuous Source Current[1] | $I_S$ | - | - | 40 | A | --- |
| Reverse Recovery Time | $t_{rr}$ | - | 25 | - | ns | $I_F$=10A, dI/dt=100A/μs,<br>$T_J$=25℃ |
| Reverse Recovery Charge | $Q_{rr}$ | - | 17 | - | nC | |

Notes: **1. The data tested by pulsed, pulse width ≦ 300us, duty cycle ≦ 2%.**

**2. $R_{θJA}$ is the sum of the junction-to-case and case-to-ambient thermal resistance where the case thermal reference is defined as the solder mounting surface of the drain pins. $R_{θJC}$ is guaranteed by design while $R_{θCA}$ is determined by the user's board design. $R_{θJA}$ shown below for single device operation on FR-4 in still air.**

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

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## Typical Characteristics

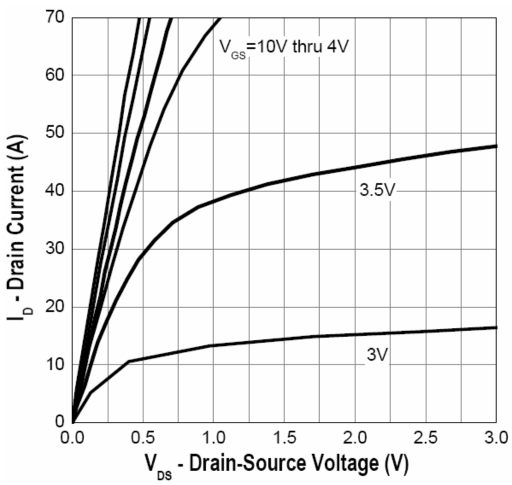


Fig.1 Typical Output Characteristics

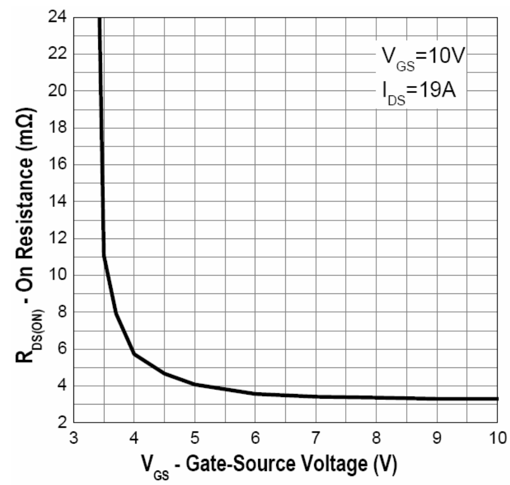


Fig.2 On-Resistance vs. G-S Voltage

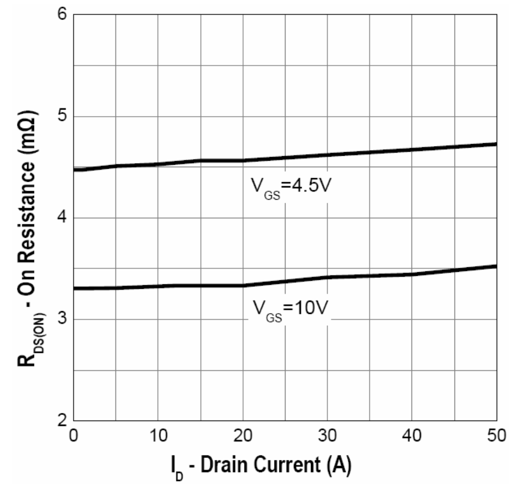


Fig.3 On-Resistance vs. Drain Current

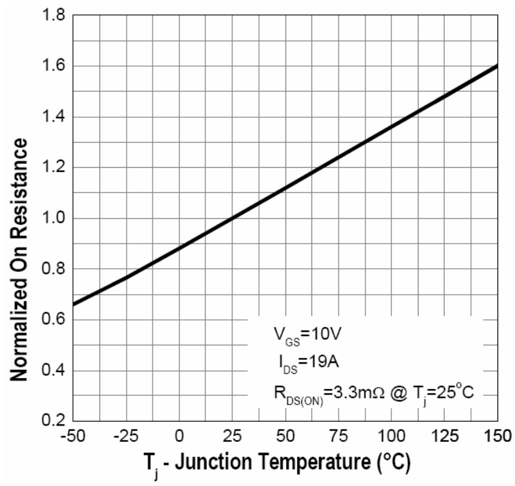


Fig.4 Normalized $R_{DSON}$ vs. $T_J$

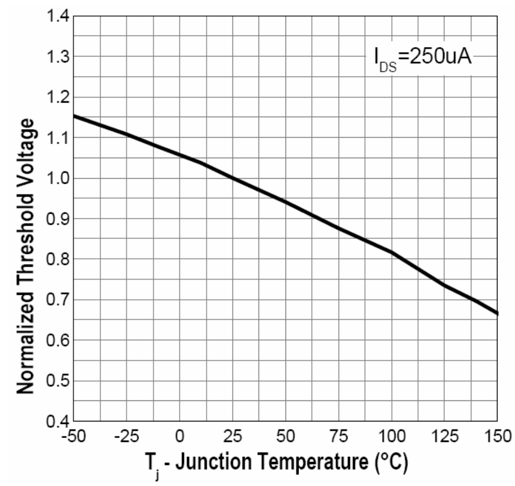


Fig.5 Normalized $V_{GS(th)}$ vs. $T_J$

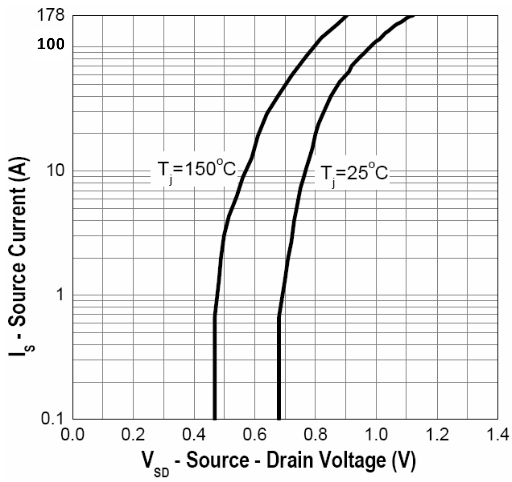


Fig.6 Forward Characteristics of Reverse

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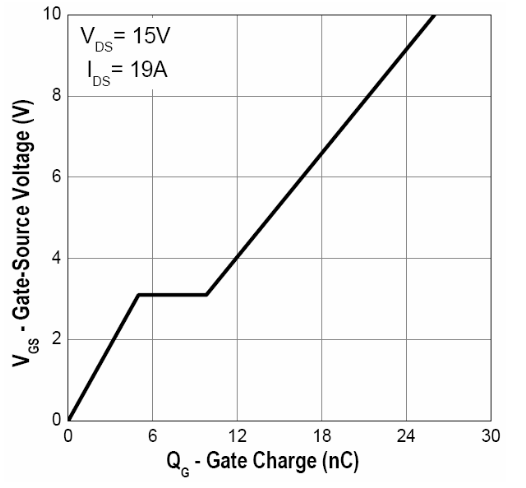


**Fig.7 Gate Charge Characteristics**

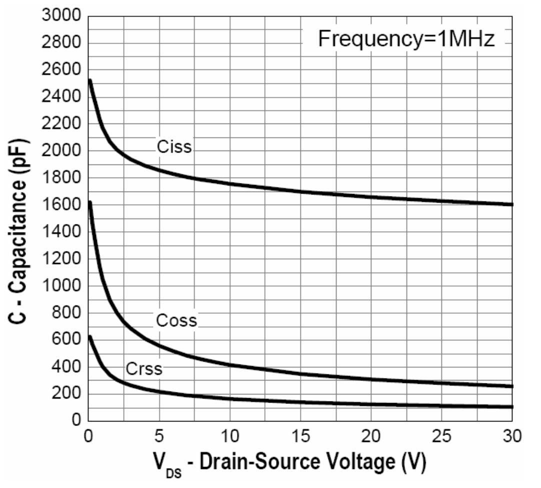


**Fig.8 Capacitance Characteristics**

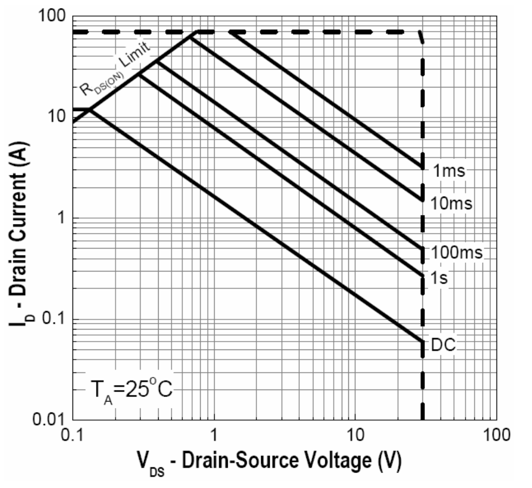


**Fig.9 Safe Operating Area**

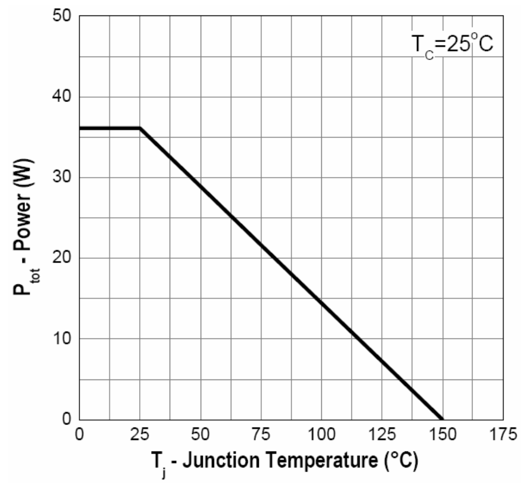


**Fig.10 Power Dissipation**

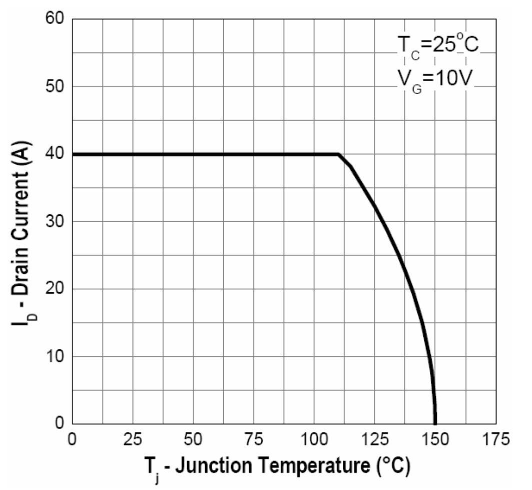


**Fig.11 Drain Current vs. $T_J$**

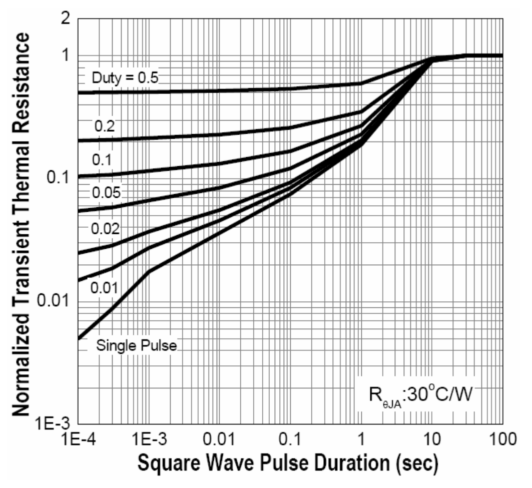


**Fig.12 Transient Thermal Impedance**