# TMMNC028

## 30V N-Channel MOSFETs

| $BV_{DSS}$ | $R_{DS(ON)}$ | $I_D$ |
|---|---|---|
| 30 V | 28 mΩ | 6 A |

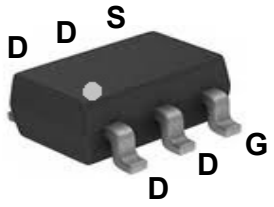
### General Description

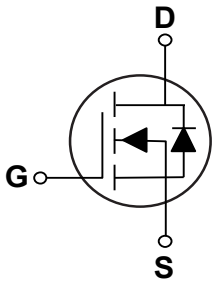
These N-Channel enhancement mode power field effect transistors are using trench DMOS technology. This advanced technology has been especially tailored to minimize on-state resistance, provide superior switching performance, and withstand high energy pulse in the avalanche and commutation mode. These devices are well suited for high efficiency fast switching applications.

### Features

- $R_{DS(ON)} \leqq 28m\Omega @ V_{GS}=10V$
- Improved dv/dt capability
- Fast switching
- Green Device Available

SOT-23-6 Pin Configuration




### Applications

- Battery Protection
- Load Switch
- Uninterruptible Power Supply

### Absolute Maximum Ratings $T_C$=25°C unless otherwise noted

| Symbol | Parameter | Rating | Units |
|---|---|---|---|
| $V_{DS}$ | Drain-Source Voltage | 30 | V |
| $V_{GS}$ | Gate-Source Voltage | ±12 | V |
| $I_D$ | Drain Current - Continuous ($T_A$=25°C) | 6 | A |
| $I_{DM}$ | Drain Current - Pulsed (NOTE 1) | 30 | A |
| $P_D$ | Power Dissipation ($T_A$=25°C) | 1 | W |
| $T_J$ | Operating Junction Temperature Range | -55 to 150 | °C |
| $T_{STG}$ | Storage Temperature Range | -55 to 150 | °C |
| Marking Code | | AP6N03LI | |

### Thermal Characteristics

| Symbol | Parameter | Rating | Unit |
|---|---|---|---|
| $R_{\theta JA}$ | Thermal Resistance Junction to Ambient | 125 | °C/W |
| $R_{\theta JC}$ | Thermal Resistance Junction to Case | 30 | °C/W |

## Electrical Characteristics ($T_J$=25°C, unless otherwise noted)

### Off Characteristics

| Symbol | Parameter | Conditions | Min. | Typ. | Max. | Unit |
|---|---|---|---|---|---|---|
| $BV_{DSS}$ | Drain-Source Breakdown Voltage | $V_{GS}$=0V , $I_D$=250uA | 30 | --- | --- | V |
| $I_{DSS}$ | Drain-Source Leakage Current | $V_{DS}$=24V , $V_{GS}$=0V | --- | --- | 1 | uA |
| $I_{GSS}$ | Gate-Source Leakage Current | $V_{GS}$=±20V , $V_{DS}$=0V | --- | --- | ±100 | nA |

### On Characteristics

| Symbol | Parameter | Conditions | Min. | Typ. | Max. | Unit |
|---|---|---|---|---|---|---|
| $R_{DS(ON)}$ | Static Drain-Source On-Resistance | $V_{GS}$=10V , $I_D$=5A | --- | --- | 28 | mΩ |
| | | $V_{GS}$=4.5V , $I_D$=3A | --- | --- | 32 | |
| | | $V_{GS}$=2.5V , $I_D$=1A | --- | --- | 45 | |
| $V_{GS(th)}$ | Gate Threshold Voltage | $V_{GS}$=$V_{DS}$ , $I_D$=250uA | 0.5 | --- | 1.5 | V |
| gfs | Forward Transconductance | $V_{DS}$=5V , $I_D$=5A | --- | 7 | --- | S |

### Dynamic and switching Characteristics

| Symbol | Parameter | Conditions | Min. | Typ. | Max. | Unit |
|---|---|---|---|---|---|---|
| $Q_g$ | Total Gate Charge | $V_{DS}$=15V , $V_{GS}$=4.5V , $I_D$=5A | --- | 6 | --- | nC |
| $Q_{gs}$ | Gate-Source Charge | | --- | 2.5 | --- | |
| $Q_{gd}$ | Gate-Drain Charge | | --- | 2.1 | --- | |
| $T_{d(on)}$ | Turn-On Delay Time | $V_{DD}$=15V , $V_{GS}$=10V , $R_G$=3.3Ω , $I_D$=5A | --- | 2.4 | --- | nS |
| $T_r$ | Rise Time | | --- | 7.8 | --- | |
| $T_{d(off)}$ | Turn-Off Delay Time | | --- | 22 | --- | |
| $T_f$ | Fall Time | | --- | 4 | --- | |
| $C_{iss}$ | Input Capacitance | $V_{DS}$=15V , $V_{GS}$=0V , F=1MHz | --- | 572 | --- | pF |
| $C_{oss}$ | Output Capacitance | | --- | 81 | --- | |
| $C_{rss}$ | Reverse Transfer Capacitance | | --- | 65 | --- | |
| $R_g$ | Gate Resistance | $V_{GS}$=0V , $V_{DS}$=0V , F=1MHz | --- | 2.5 | --- | Ω |

### Drain-Source Diode Characteristics and Ratings

| Symbol | Parameter | Conditions | Min. | Typ. | Max. | Unit |
|---|---|---|---|---|---|---|
| $I_S$ | Continuous Source Current | $V_G$=$V_D$=0V , Force Current | --- | --- | 5.8 | A |
| $I_{SM}$ | Pulsed Source Current | | --- | --- | 30 | A |
| $V_{SD}$ | Diode Forward Voltage | $V_{GS}$=0V , $I_S$=3A | --- | --- | 1.2 | V |

NOTES：

1. Repetitive Rating：Pulsed width limited by maximum junction temperature.
2. The data tested by pulsed , pulse width ≦ 300us , duty cycle ≦ 2%.
3. The data is theoretically the same as $I_D$ and $I_{DM}$, in real applications, should be limited by total power dissipation.

## Characteristics Curves

FIG. 1-Output Characteristics

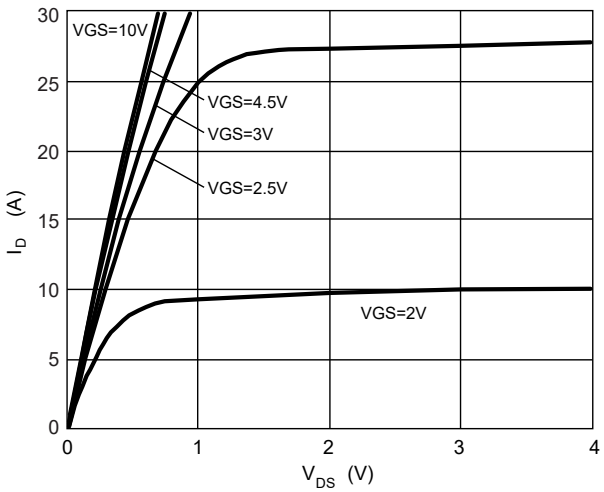



FIG. 2-$R_{DS(ON)}$ vs $V_{GS}$

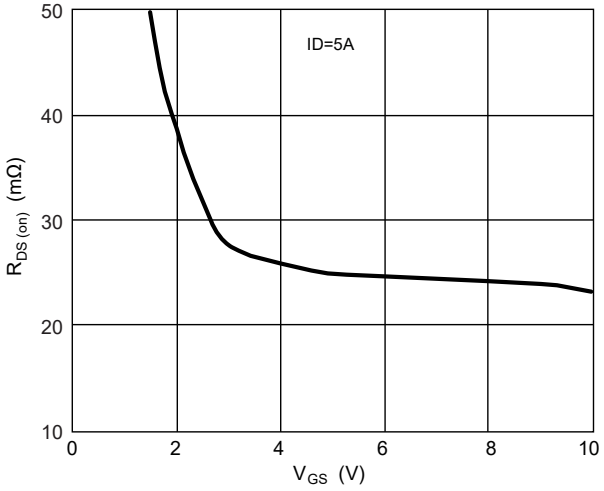



FIG. 3-Forward Characteristics of Diode

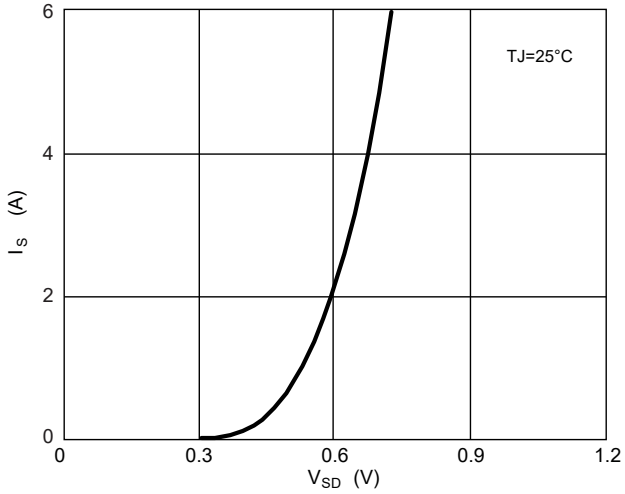



FIG. 4-Normalized $R_{DS(ON)}$ vs $T_J$

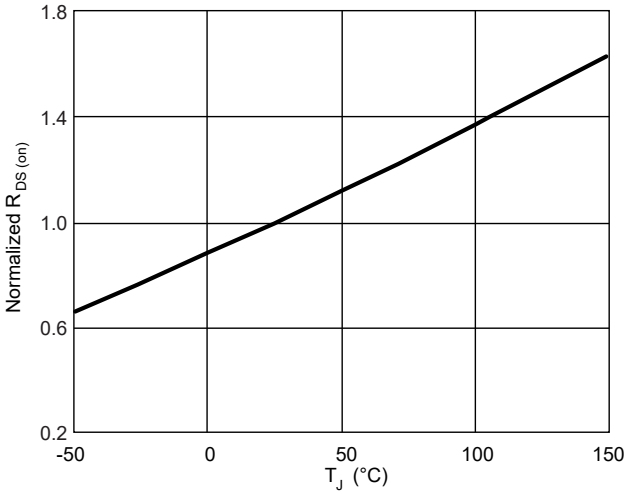



FIG. 5-Normalized $V_{GS(th)}$ vs $T_J$

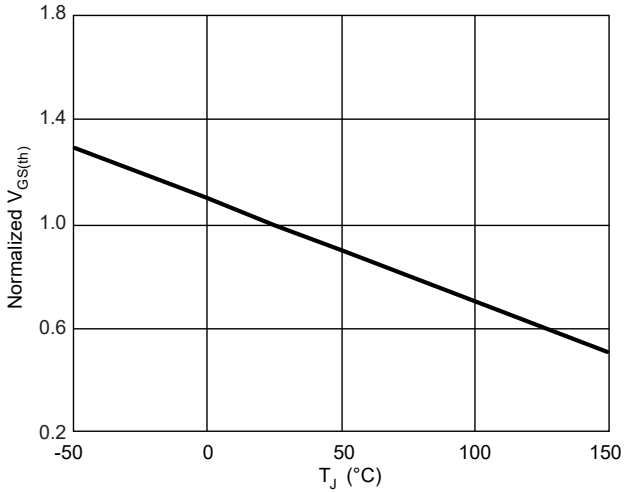
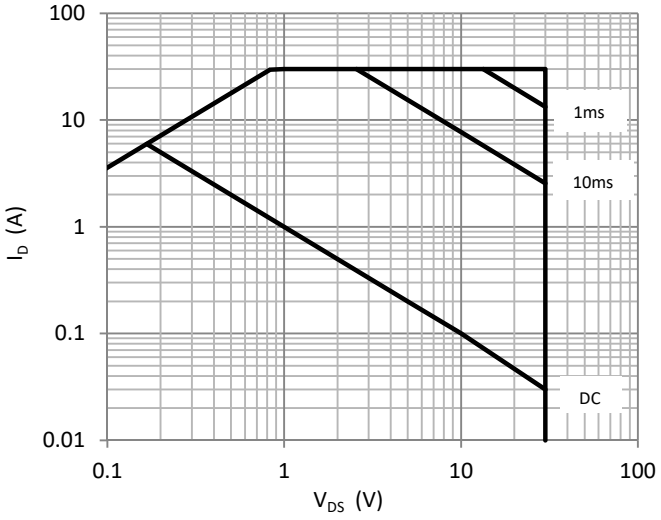



FIG. 6-Safe Operation Area



## Characteristics Curves

FIG. 7-Switching Time Waveform

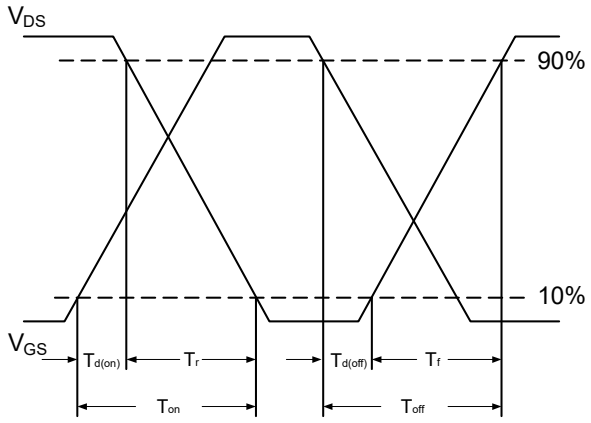
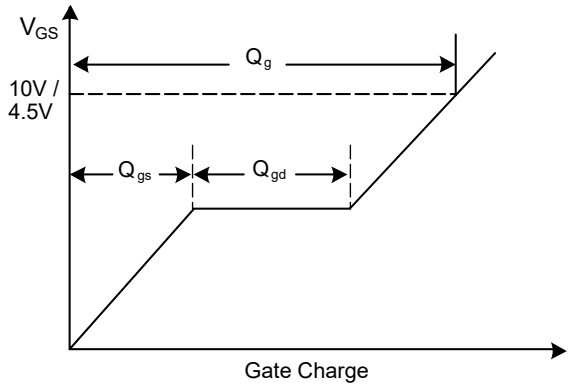
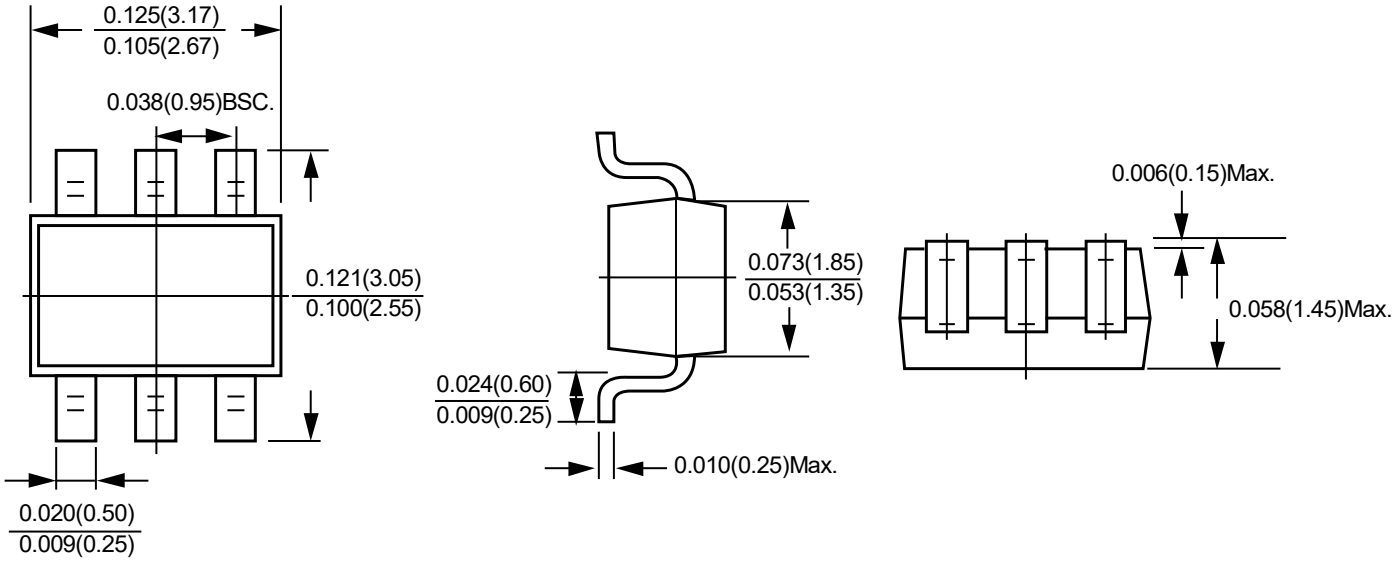



FIG. 8-Gate Charge Waveform




## Package Outline Dimensions




**SOT-23-6**

Dimensions in inches and (millimeters)

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