XNRUSEMI

# XR30P10HT

## P-Ch 100V Fast Switching MOSFETs

- ★ Super Low Gate Charge
- ★ 100% EAS Guaranteed
- ★ Green Device Available
- ★ Excellent CdV/dt effect decline
- ★ Advanced high cell density Trench technology

### Product Summary

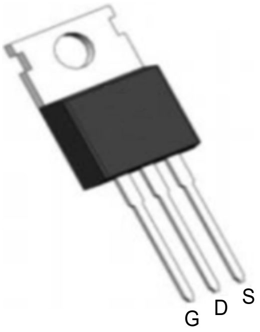
| BVDSS | RDSON | ID |
|---|---|---|
| -100V | 47mΩ | -30A |

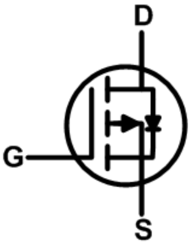
### Description

The XR30P10HT is the high cell density trenched P-ch MOSFETs, which provide excellent RDSON and gate charge for most of the synchronous buck converter applications.

The XR30P10HT meet the RoHS and Green Product requirement 100% EAS guaranteed with full function reliability approved.

### TO220 Pin Configuration





### Absolute Maximum Ratings

| Symbol | Parameter | Rating | Units |
|---|---|---|---|
| $V_{DS}$ | Drain-Source Voltage | -100 | V |
| $V_{GS}$ | Gate-Source Voltage | ±20 | V |
| $I_D$@$T_C$=25˚C | Continuous Drain Current, $V_{GS}$ @ 10V[1,6] | -30 | A |
| $I_D$@$T_C$=100˚C | Continuous Drain Current, $V_{GS}$ @ 10V[1,6] | -14 | A |
| $I_{DM}$ | Pulsed Drain Current[2] | -120 | A |
| EAS | Single Pulse Avalanche Energy[3] | 361 | mJ |
| $I_{AS}$ | Avalanche Current | --- | A |
| $P_D$@$T_C$=25˚C | Total Power Dissipation[4] | 53 | W |
| $T_{STG}$ | Storage Temperature Range | -55 to 150 | ˚C |
| $T_J$ | Operating Junction Temperature Range | -55 to 150 | ˚C |

### Thermal Data

| Symbol | Parameter | Typ. | Max. | Unit |
|---|---|---|---|---|
| $R_{\theta JA}$ | Thermal Resistance Junction-Ambient [1] | --- | --- | ˚C/W |
| $R_{\theta JC}$ | Thermal Resistance Junction-Case[1] | --- | 1.4 | ˚C/W |

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

| Symbol | Parameter | Conditions | Min. | Typ. | Max. | Unit |
|---|---|---|---|---|---|---|
| $BV_{DSS}$ | Drain-Source Breakdown Voltage | $V_{GS}$=0V , $I_D$=-250uA | -100 | --- | --- | V |
| $\triangle BV_{DSS}/\triangle T_J$ | $BV_{DSS}$ Temperature Coefficient | Reference to 25°C , $I_D$=1mA | --- | --- | --- | V/℃ |
| $R_{DS(ON)}$ | Static Drain-Source On-Resistance[2] | $V_{GS}$=-10V , $I_D$=-15A | --- | 47 | 70 | mΩ |
| | | $V_{GS}$=-4.5V , $I_D$=-10A | --- | --- | --- | |
| | | $V_{GS}$=-2.5V , $I_D$=-5A | --- | --- | --- | |
| $V_{GS(th)}$ | Gate Threshold Voltage | $V_{GS}$=$V_{DS}$ , $I_D$ =-250uA | -2 | -2.8 | -4 | V |
| $\triangle V_{GS(th)}$ | $V_{GS(th)}$ Temperature Coefficient | | --- | --- | --- | mV/℃ |
| $I_{DSS}$ | Drain-Source Leakage Current | $V_{DS}$=-100V , $V_{GS}$=0V , $T_J$=25°C | --- | --- | -1 | uA |
| | | $V_{DS}$=-100V, $V_{GS}$=0V , $T_J$=100°C | --- | --- | -100 | |
| $I_{GSS}$ | Gate-Source Leakage Current | $V_{GS}$=±20V , $V_{DS}$=0V | --- | --- | ±100 | nA |
| gfs | Forward Transconductance | $V_{DS}$=-5V , $I_D$=-15A | --- | 50 | --- | S |
| $Q_g$ | Total Gate Charge | $V_{DS}$=-50V , $V_{GS}$=-10V , $I_D$=-10A | --- | 74 | --- | nC |
| $Q_{gs}$ | Gate-Source Charge | | --- | 9 | --- | |
| $Q_{gd}$ | Gate-Drain Charge | | --- | 16 | --- | |
| $T_{d(on)}$ | Turn-On Delay Time | $V_{DD}$=-50V , $V_{GS}$=-10V , $R_G$=9.1Ω | --- | 7 | --- | ns |
| $T_r$ | Rise Time | | --- | 33 | --- | |
| $T_{d(off)}$ | Turn-Off Delay Time | | --- | 19 | --- | |
| $T_f$ | Fall Time | | --- | 28 | --- | |
| $C_{iss}$ | Input Capacitance | $V_{DS}$=-25V , $V_{GS}$=0V , f=1MHz | --- | 4020 | --- | pF |
| $C_{oss}$ | Output Capacitance | | --- | 101 | --- | |
| $C_{rss}$ | Reverse Transfer Capacitance | | --- | 36 | --- | |

## Diode Characteristics

| Symbol | Parameter | Conditions | Min. | Typ. | Max. | Unit |
|---|---|---|---|---|---|---|
| $I_S$ | Continuous Source Current[1,4] | $V_G$=$V_D$=0V , Force Current | --- | --- | -30 | A |
| $I_{SM}$ | Pulsed Source Current[2,4] | | --- | --- | -120 | A |
| $V_{SD}$ | Diode Forward Voltage[2] | $V_{GS}$=0V , $I_S$=-1A , $T_J$=25℃ | --- | --- | -1.2 | V |
| $t_{rr}$ | Reverse Recovery Time | IF=-15A , di/dt=100A/μs , $T_J$=25℃ | --- | 37 | --- | nS |
| $Q_{rr}$ | Reverse Recovery Charge | | --- | 60 | --- | nC |

Note :

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 TJ = 25℃,VDD=50V,VG=-10V, Rg=25Ω, L=0.5mH.

4.The power dissipation is limited by 150°C junction temperature

5.The data is theoretically the same as $I_D$ and $I_{DM}$ , in real applications , should be limited by total power dissipation.

## Typical Electrical And Thermal Characteristics (Curves)

**Figure 1. Output Characteristics**

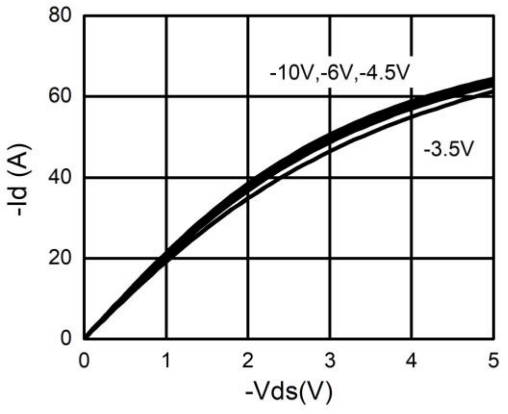


**Figure 2. Transfer Characteristics**

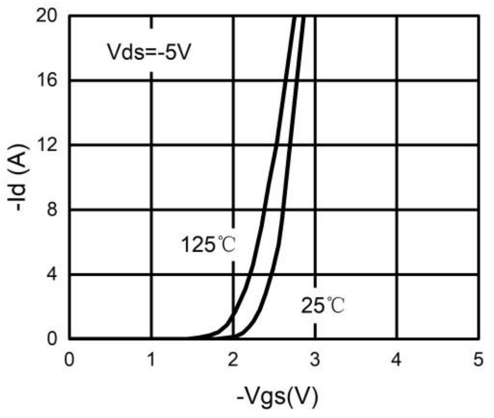


**Figure 3. Power Dissipation**

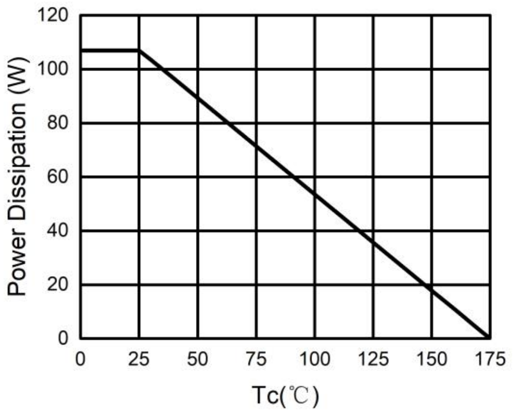


**Figure 4. Drain Current**

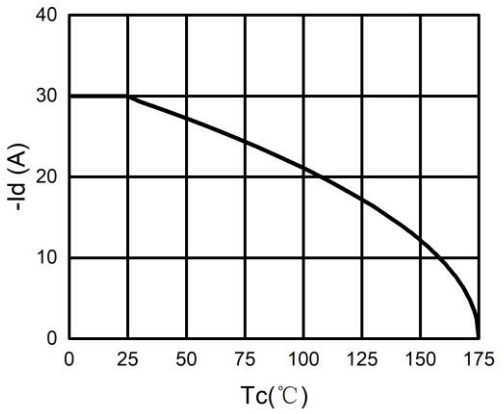


**Figure 5. $BV_{DSS}$ vs Junction Temperature**

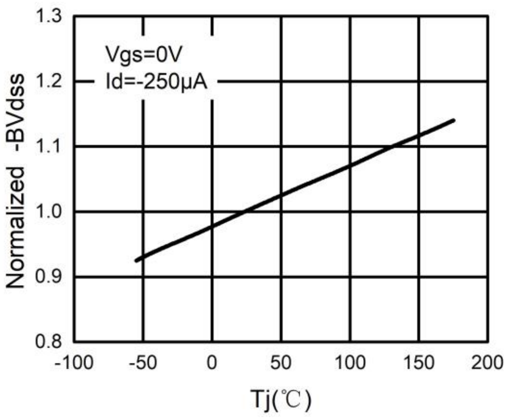


**Figure 6. $R_{DS(ON)}$ vs Junction Temperature**

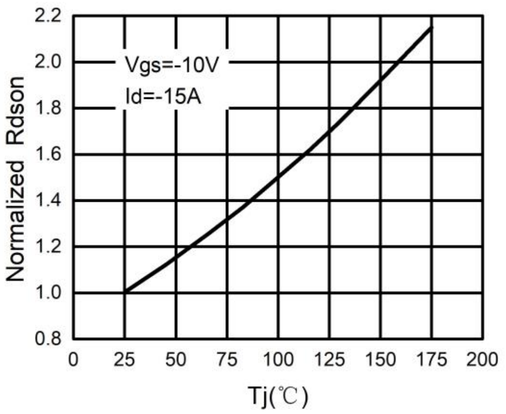


**Figure 7. Gate Charge Waveforms**

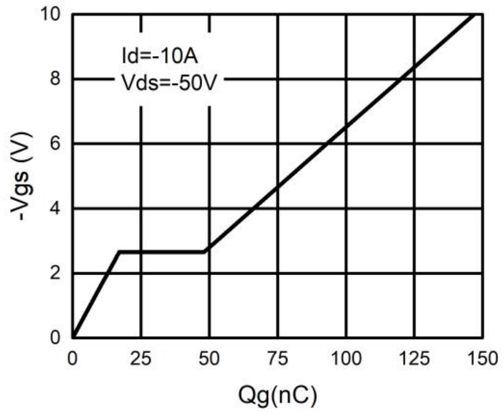


**Figure 8. Capacitance**

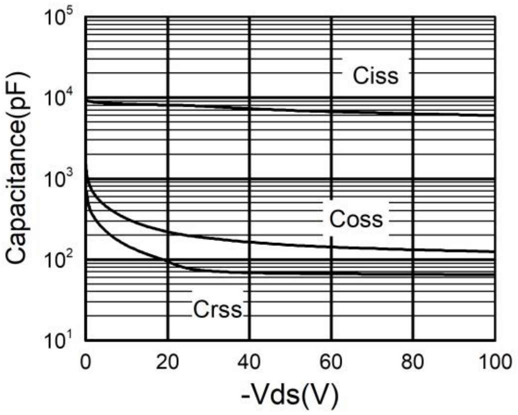


**Figure 9. Body-Diode Characteristics**

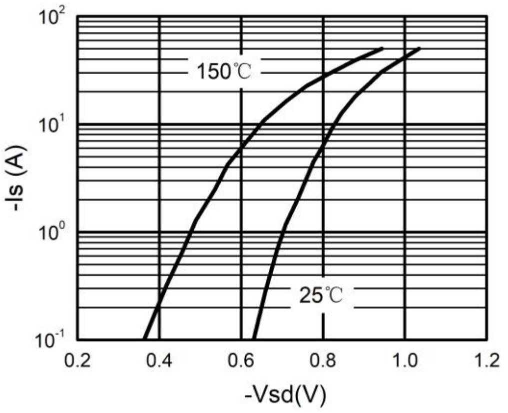
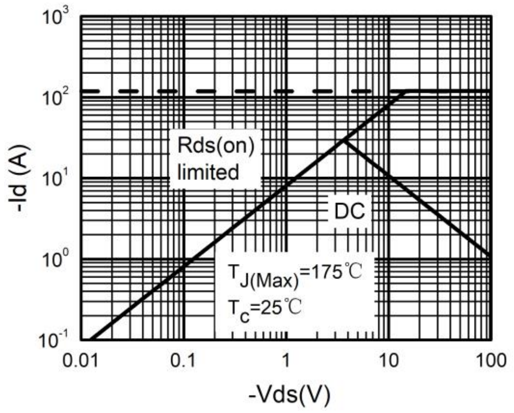
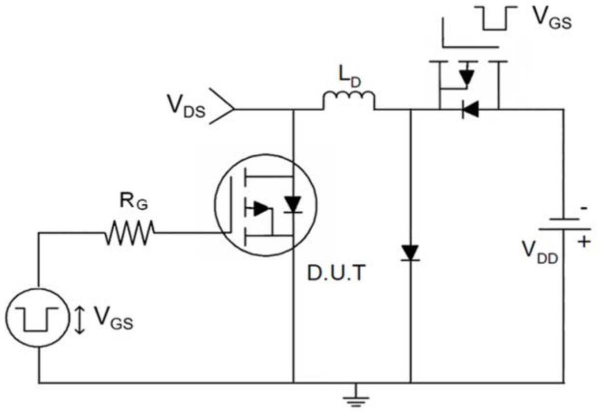


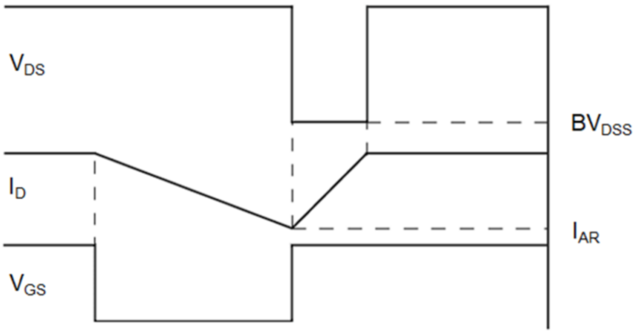
**Figure 10. Maximum Safe Operating Area**



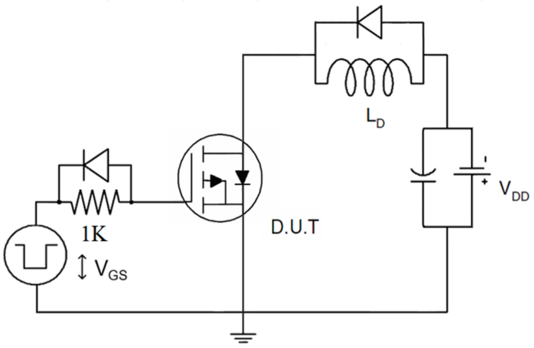
# Test Circuit

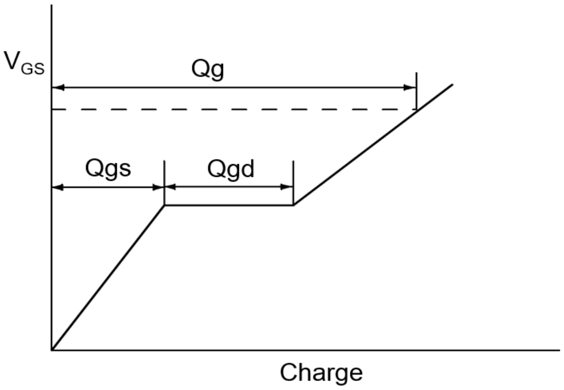
## 1) $E_{AS}$ Test Circuits



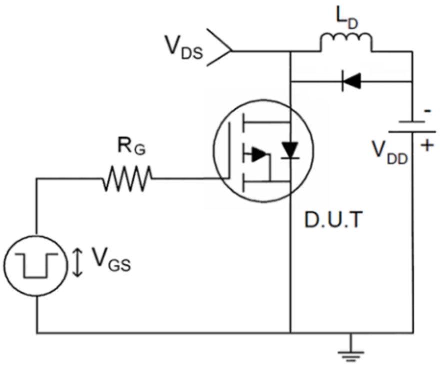


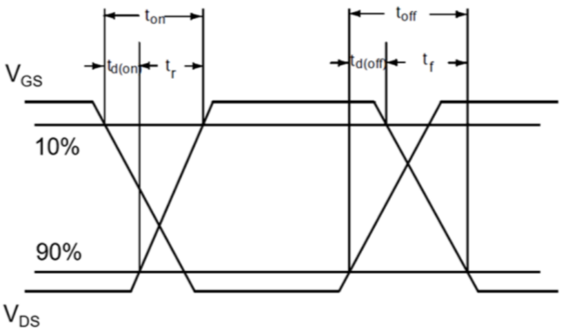
## 2) Gate Charge Test Circuit



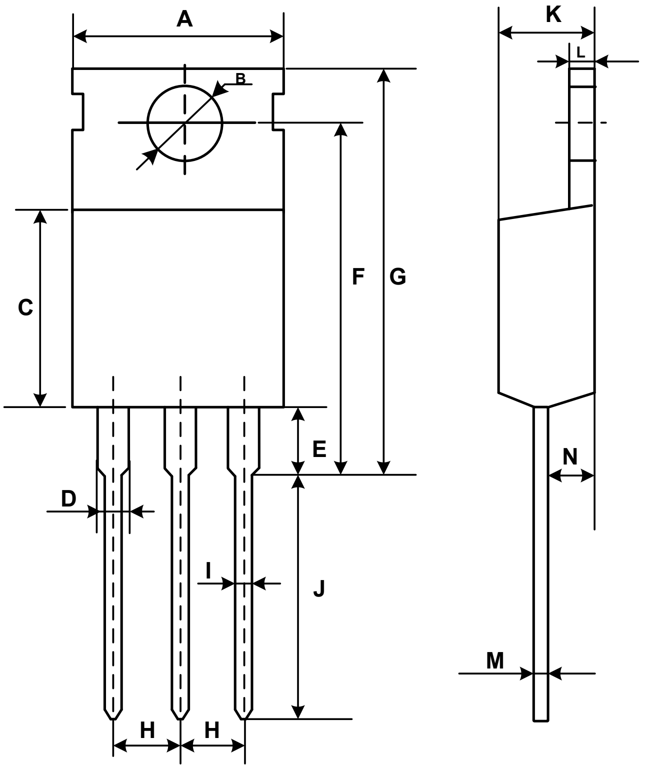


## 3) Switch Time Test Circuit





**Mechanical Dimensions for TO220**



OMMON DIMENSIONS

| SYMBOL | MM | |
|---|---|---|
| | MIN | MAX |
| A | 9.70 | 10.30 |
| B | 3.40 | 3.80 |
| C | 8.80 | 9.40 |
| D | 1.17 | 1.47 |
| E | 2.60 | 3.50 |
| F | 15.10 | 16.70 |
| G | 19.55MAX | |
| H | 2.54REF | |
| I | 0.70 | 0.95 |
| J | 9.35 | 11.00 |
| K | 4.30 | 4.77 |
| L | 1.20 | 1.45 |
| M | 0.40 | 0.65 |
| N | 2.20 | 2.60 |