# HXY3407MI

P-Channel Enhancement Mode MOSFET

## Description

The HXY3407MI uses advanced trench technology to provide excellent $R_{DS(ON)}$, low gate charge and operation with gate voltages as low as 2.5V.
This device is suitable for use as a Battery protection or in other Switching application.


SOT23-3L

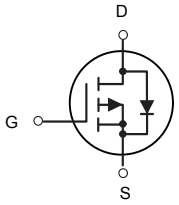
## General Features

$V_{DS}$ = -30V,$I_D$ = -4.1A

$R_{DS(ON)}$ <60mΩ @ $V_{GS}$=10V

## Application

High power and current handing capability
Lead free product is acquired
Surface mount package
PWM applications
Load switch
Power management




P-Channel MOSFET

## Package Marking and Ordering Information

| Product ID | Pack | Marking | Qty(PCS) |
|---|---|---|---|
| HXY3407MI | SOT23-3L | A7NV 1B | 3000PCS |

## Absolute Maximum Ratings ($T_A$=25℃unless otherwise noted)

| Symbol | Parameter | Limit | Unit |
|---|---|---|---|
| $V_{DS}$ | Drain-Source Voltage | -30 | V |
| $V_{GS}$ | Gate-Source Voltage | ±20 | V |
| $I_D$ | Drain Current-Continuous | -4.1 | A |
| $I_{DM}$ | Drain Current-Pulsed (Note 1) | -13 | A |
| $P_D$ | Maximum Power Dissipation | 1.32 | W |
| $T_J$,$T_{STG}$ | Operating Junction and Storage Temperature Range | -55 To 150 | ℃ |
| $R_{\theta JA}$ | Thermal Resistance,Junction-to-Ambient (Note 2) | 125 | ℃/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 | -30 | --- | --- | V |
| $\triangle BV_{DSS}/\triangle T_J$ | BVDSS Temperature Coefficient | Reference to 25℃ , $I_D$=-1mA | --- | -0.02 | --- | V/℃ |
| $R_{DS(ON)}$ | Static Drain-Source On-Resistance[2] | $V_{GS}$=-10V , $I_D$=-3A | --- | 55 | 60 | mΩ |
| | | $V_{GS}$=-4.5V , $I_D$=-1.5A | --- | 90 | 98 | |
| $V_{GS(th)}$ | Gate Threshold Voltage | $V_{GS}$=$V_{DS}$ , $I_D$ =-250uA | -1.2 | -1.5 | -2.5 | V |
| $\triangle V_{GS(th)}$ | $V_{GS(th)}$ Temperature Coefficient | | --- | 4.32 | --- | mV/℃ |
| $I_{DSS}$ | Drain-Source Leakage Current | $V_{DS}$=-24V , $V_{GS}$=0V , $T_J$=25℃ | --- | --- | -1 | uA |
| | | $V_{DS}$=-24V , $V_{GS}$=0V , $T_J$=55℃ | --- | --- | -5 | |
| $I_{GSS}$ | Gate-Source Leakage Current | $V_{GS}$=±20V , $V_{DS}$=0V | --- | --- | ±100 | nA |
| gfs | Forward Transconductance | $V_{DS}$=-5V , $I_D$=-3A | --- | 4.8 | --- | S |
| $R_g$ | Gate Resistance | $V_{DS}$=0V , $V_{GS}$=0V , f=1MHz | --- | 24 | 48 | Ω |
| $Q_g$ | Total Gate Charge (-4.5V) | $V_{DS}$=-20V , $V_{GS}$=-4.5V , $I_D$=-3A | --- | 5.22 | 7.3 | nC |
| $Q_{gs}$ | Gate-Source Charge | | --- | 1.25 | 1.8 | |
| $Q_{gd}$ | Gate-Drain Charge | | --- | 2.3 | 3.2 | |
| $T_{d(on)}$ | Turn-On Delay Time | $V_{DD}$=-15V , $V_{GS}$=-10V , $R_G$=3.3Ω $I_D$=-1A | --- | 18.4 | 37 | ns |
| $T_r$ | Rise Time | | --- | 11.4 | 21 | |
| $T_{d(off)}$ | Turn-Off Delay Time | | --- | 39.4 | 79 | |
| $T_f$ | Fall Time | | --- | 5.2 | 10.4 | |
| $C_{iss}$ | Input Capacitance | $V_{DS}$=-15V , $V_{GS}$=0V , f=1MHz | --- | 463 | 650 | pF |
| $C_{oss}$ | Output Capacitance | | --- | 82 | 115 | |
| $C_{rss}$ | Reverse Transfer Capacitance | | --- | 68 | 95 | |

## Diode Characteristics

| Symbol | Parameter | Conditions | Min. | Typ. | Max. | Unit |
|---|---|---|---|---|---|---|
| $I_S$ | Continuous Source Current[1,4] | $V_G$=$V_D$=0V , Force Current | --- | --- | -3.2 | A |
| $I_{SM}$ | Pulsed Source Current[2,4] | | --- | --- | -13 | A |
| $V_{SD}$ | Diode Forward Voltage[2] | $V_{GS}$=0V , $I_S$=-1A , $T_J$=25℃ | --- | --- | -1 | V |

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 power dissipation is limited by 150℃ junction temperature
4.The data is theoretically the same as $I_D$ and $I_{DM}$ , in real applications , should be limited by total power dissipation.

## Typical Characteristics

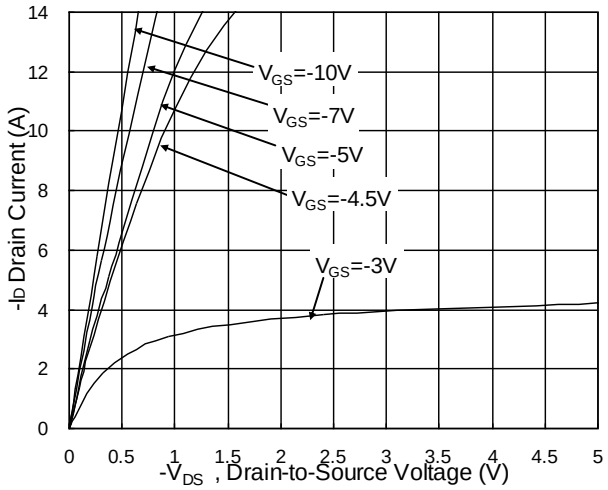



**Fig.1 Typical Output Characteristics**

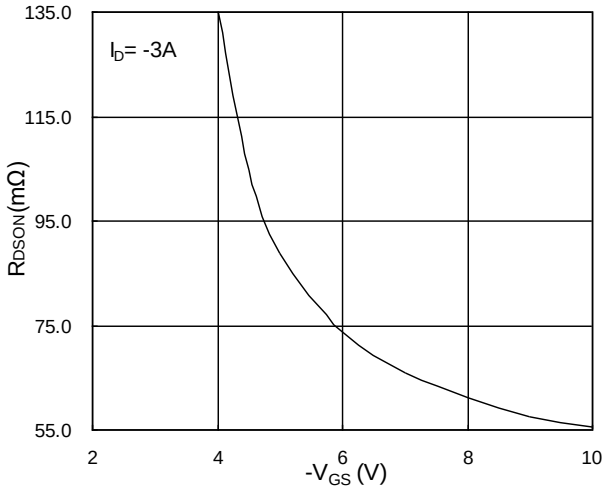



**Fig.2 On-Resistance vs. G-S Voltage**

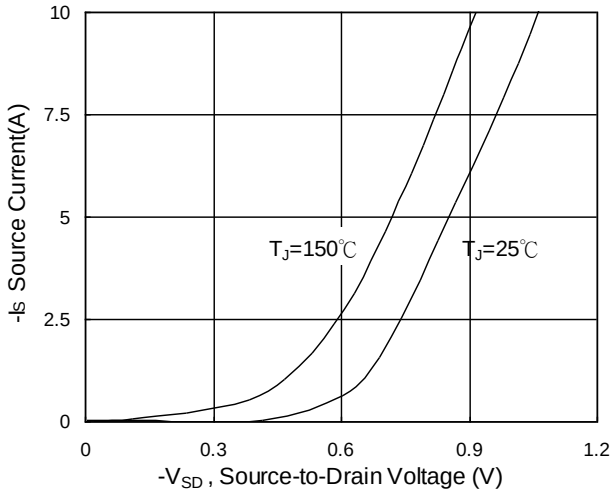



**Fig.3 Source Drain Forward Characteristics**

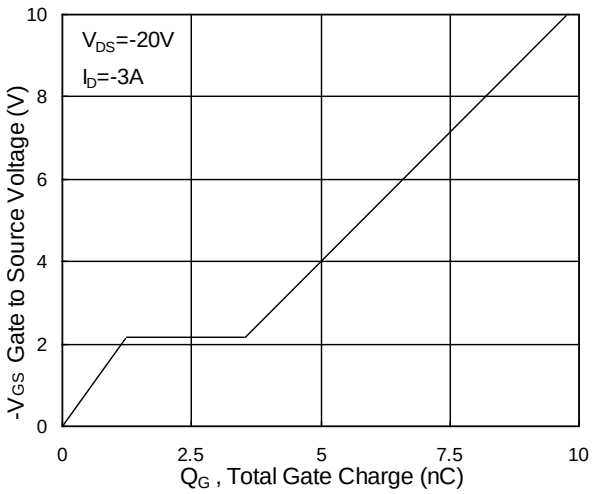



**Fig.4 Gate-Charge Characteristics**

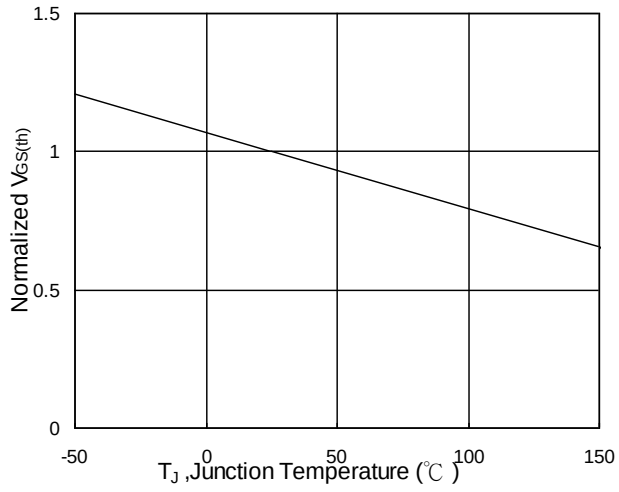



**Fig.5 Normalized $V_{GS(th)}$ vs. $T_J$**

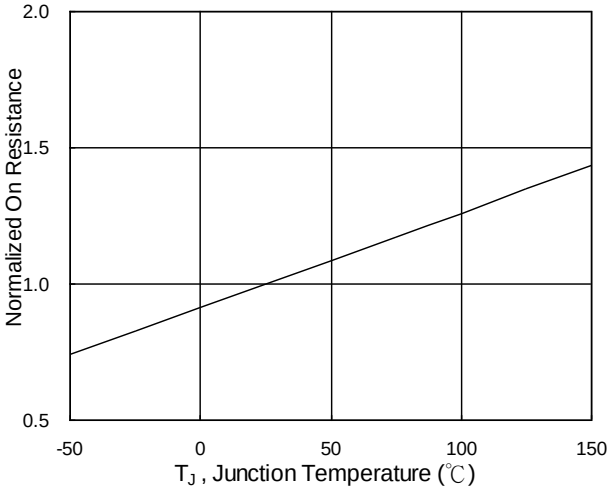



**Fig.6 Normalized $R_{DSON}$ vs. $T_J$**

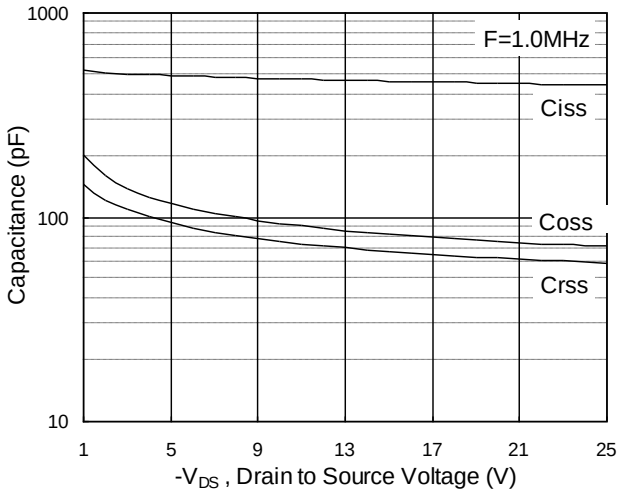



**Fig.7 Capacitance**

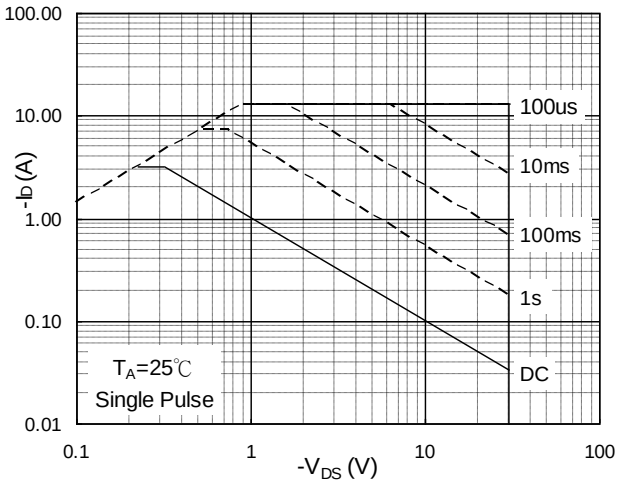



**Fig.8 Safe Operating Area**

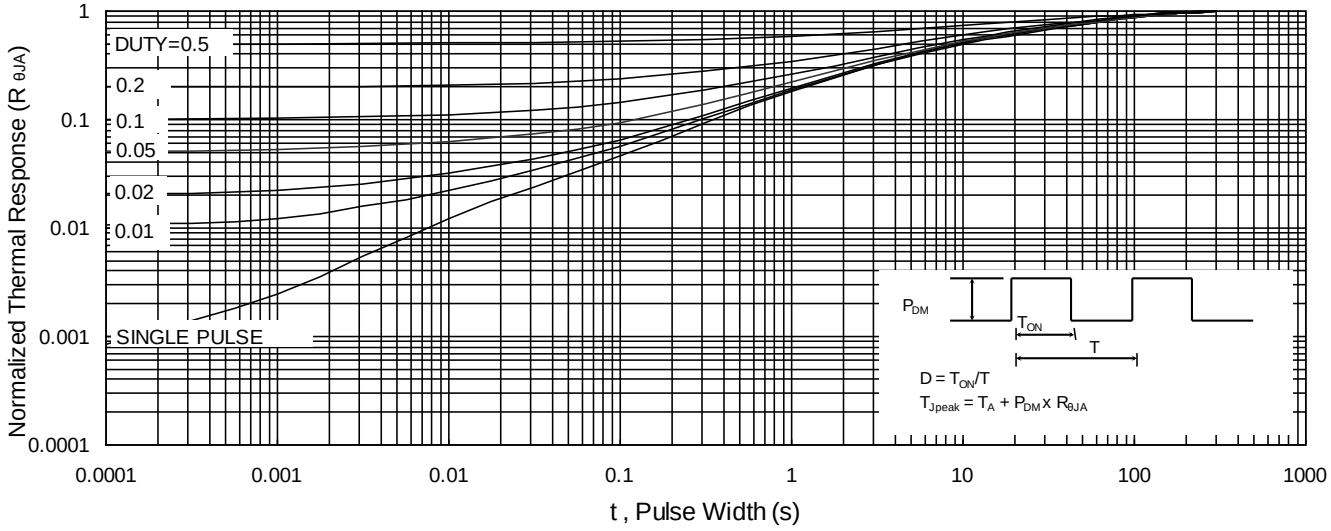



**Fig.9 Normalized Maximum Transient Thermal Impedance**

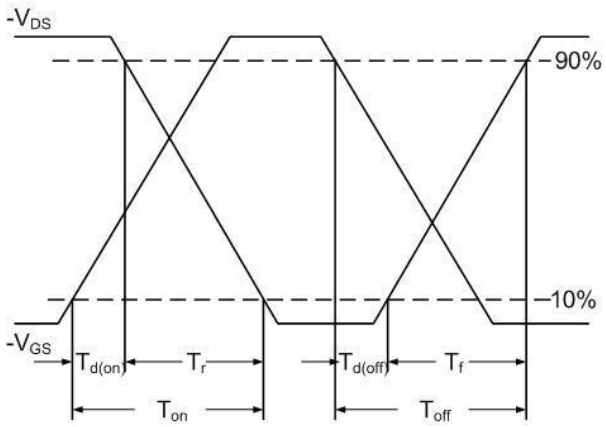



**Fig.10 Switching Time Waveform**

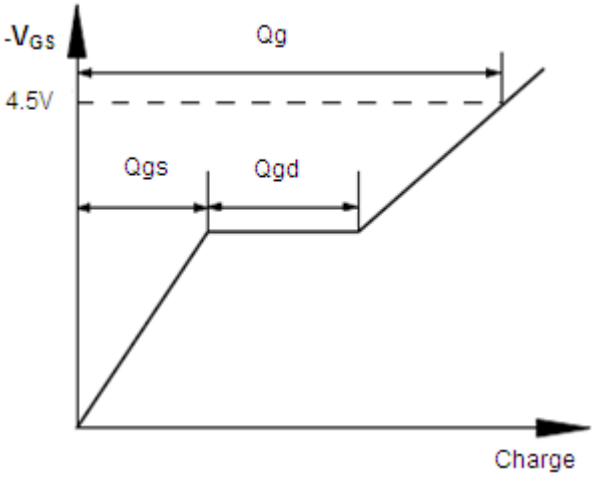
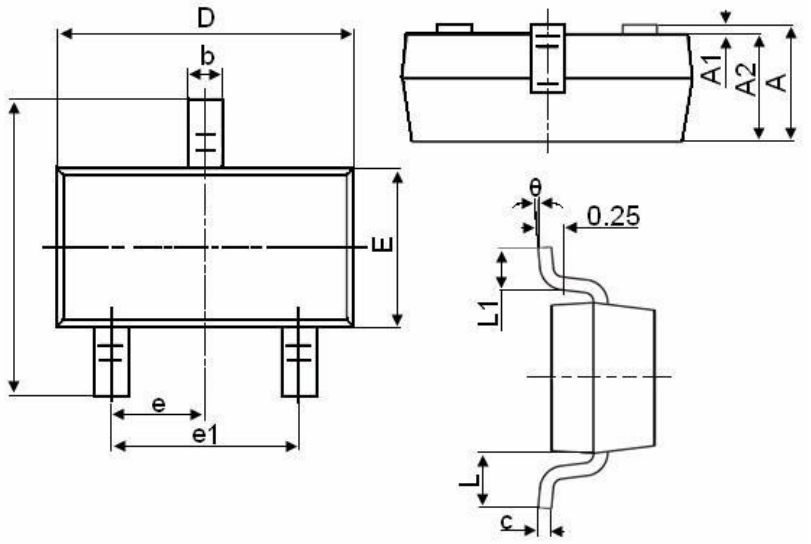



**Fig.11 Gate Charge Waveform**

## SOT23-3L Package Information




| Symbol | Dimensions in Millimeters | |
|---|---|---|
| | MIN. | MAX. |
| A | 1.050 | 1.250 |
| A1 | 0.000 | 0.100 |
| A2 | 1.050 | 1.150 |
| b | 0.300 | 0.500 |
| c | 0.100 | 0.200 |
| D | 2.800 | 3.000 |
| E | 1.500 | 1.700 |
| E1 | 2.650 | 2.950 |
| e | 0.950TYP | |
| e1 | 1.800 | 2.000 |
| L | 0.550REF | |
| L1 | 0.300 | 0.600 |
| θ | 0° | 8° |

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