



## Description

The HXY3416MI 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.

## General Features

$V_{DS} = 20V$   $I_D = 6.5A$

$R_{DS(ON)} < 27m\Omega @ V_{GS}=4.5V$

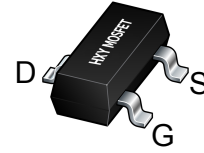
ESD=2500HBM

## Application

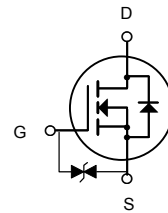
Battery protection

Load switch

Uninterruptible power supply



SOT23-3L



N-Channel MOSFET

## Package Marking and Ordering Information

| Product ID | Pack     | Marking | Qty(PCS) |
|------------|----------|---------|----------|
| HXY3416MI  | SOT23-3L | AGBV 1N | 3000     |

## Absolute Maximum Ratings ( $T_A=25^\circ C$ unless otherwise noted)

| Symbol          | Parameter  | Limit      | Unit         |
|-----------------|--|------------|--------------|
| $V_{DS}$        | Drain-Source Voltage                             | 20         | V            |
| $V_{GS}$        | Gate-Source Voltage                              | $\pm 12$   | V            |
| $I_D$           | Drain Current-Continuous                         | 6.5        | A            |
| $I_{DM}$        | Drain Current-Pulsed (Note 1)                    | 30         | A            |
| $P_D$           | Maximum Power Dissipation                        | 1.4        | W            |
| $T_J, T_{STG}$  | Operating Junction and Storage Temperature Range | -55 To 150 | $^\circ C$   |
| $R_{\theta JA}$ | Thermal Resistance, Junction-to-Ambient (Note 2) | 89         | $^\circ C/W$ |



### Electrical Characteristics ( $T_A=25^\circ\text{C}$ unless otherwise noted)

| Parameter                                 | Symbol       | Condition   | Min  | Typ | Max      | Unit      |
|---|--------------|---|------|-----|----------|-----------|
| Drain-Source Breakdown Voltage            | $BV_{DSS}$   | $V_{GS}=0V, I_D=250\mu A$                                   | 20   |     | -        | V         |
| Zero Gate Voltage Drain Current           | $I_{DSS}$    | $V_{DS}=20V, V_{GS}=0V$                                     | -    | -   | 1        | $\mu A$   |
| Gate-Body Leakage Current                 | $I_{GSS}$    | $V_{GS}=\pm 10V, V_{DS}=0V$                                 | -    | -   | $\pm 10$ | $\mu A$   |
| Gate Threshold Voltage                    | $V_{GS(th)}$ | $V_{DS}=V_{GS}, I_D=250\mu A$                               | 0.45 | 0.7 | 1.0      | V         |
| Drain-Source On-State Resistance          | $R_{DS(on)}$ | $V_{GS}=4.5V, I_D=6.5A$                                     | -    | 17  | 27       | $m\Omega$ |
|   |              | $V_{GS}=2.5V, I_D=5.5A$                                     | -    | 21  | 33       | $m\Omega$ |
|   |              | $V_{GS}=1.8V, I_D=5A$                                       | -    | 28  | 40       | $m\Omega$ |
| Forward Transconductance                  | $g_{FS}$     | $V_{DS}=5V, I_D=6.5A$                                       | 8    | -   | -        | S         |
| Input Capacitance                         | $C_{ISS}$    | $V_{DS}=10V, V_{GS}=0V,$<br>$F=1.0MHz$                      | -    | 660 | -        | PF        |
| Output Capacitance                        | $C_{OSS}$    |   | -    | 160 | -        | PF        |
| Reverse Transfer Capacitance              | $C_{RSS}$    |   | -    | 87  | -        | PF        |
| Turn-on Delay Time                        | $t_{d(on)}$  | $V_{DD}=10V, R_L=1.5\Omega$<br>$V_{GS}=5V, R_{GEN}=3\Omega$ | -    | 0.5 |          | nS        |
| Turn-on Rise Time                         | $t_r$        |   | -    | 1   |          | nS        |
| Turn-Off Delay Time                       | $t_{d(off)}$ |   | -    | 12  |          | nS        |
| Turn-Off Fall Time                        | $t_f$        |   | -    | 4   |          | nS        |
| Total Gate Charge                         | $Q_g$        | $V_{DS}=10V, I_D=6.5A,$<br>$V_{GS}=4.5V$                    | -    | 8   |          | nC        |
| Gate-Source Charge                        | $Q_{gs}$     |   | -    | 2.5 | -        | nC        |
| Gate-Drain Charge                         | $Q_{gd}$     |   | -    | 3   | -        | nC        |
| Diode Forward Voltage <sup>(Note 3)</sup> | $V_{SD}$     | $V_{GS}=0V, I_S=6.5A$                                       | -    | -   | 1.2      | V         |
| Diode Forward Current <sup>(Note 2)</sup> | $I_S$        |   | -    | -   | 6.5      | A         |

#### Notes:

Repetitive Rating: Pulse width limited by maximum junction temperature.

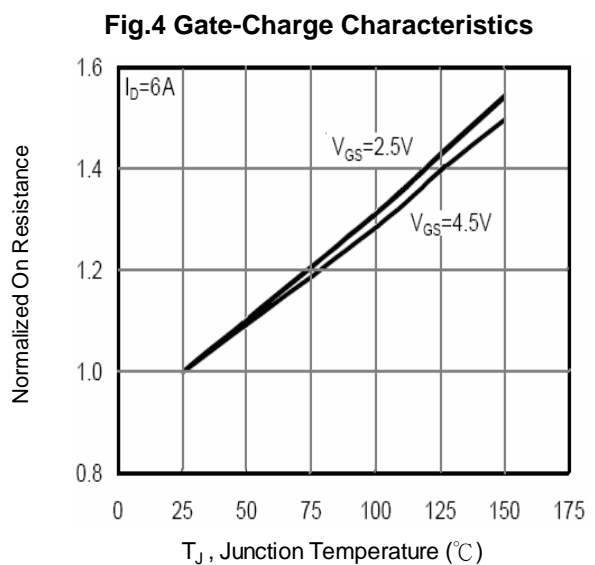
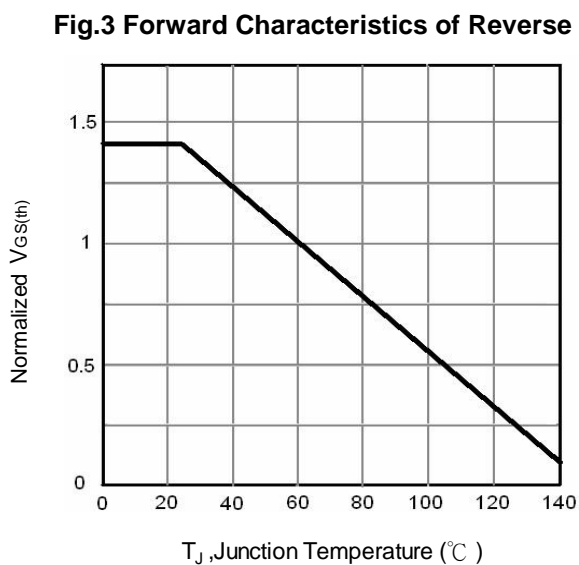
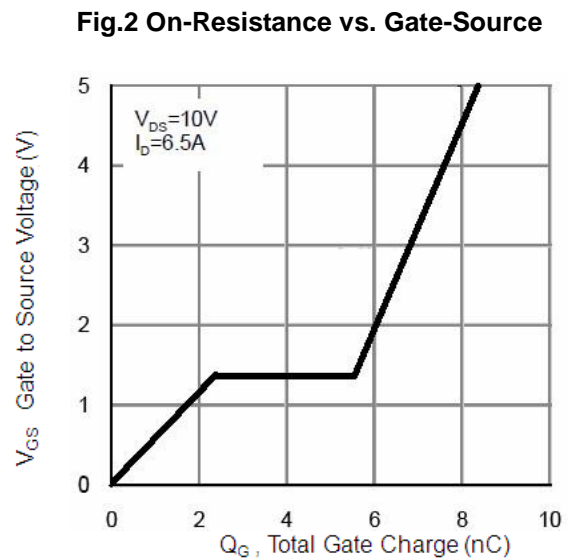
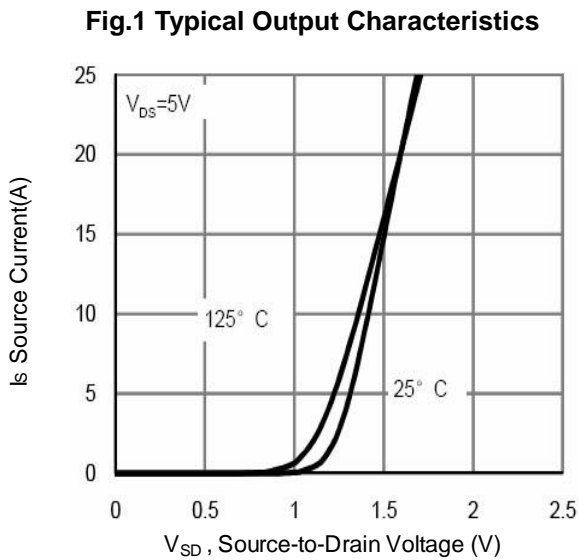
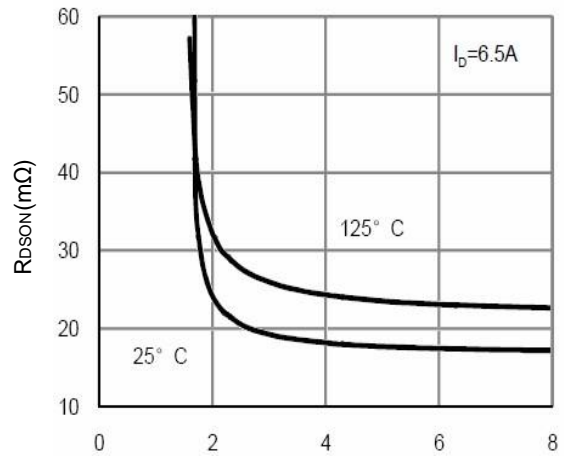
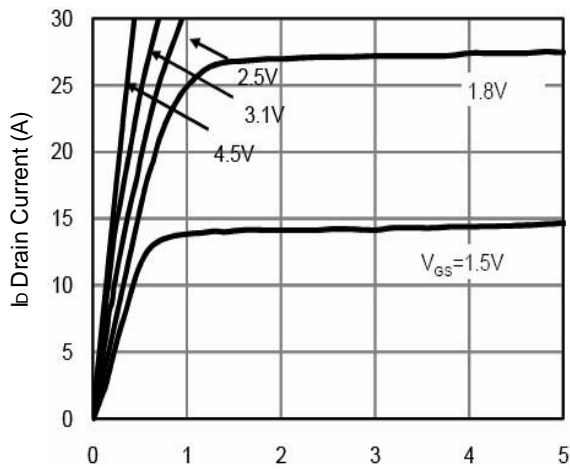
Surface Mounted on FR4 Board,  $t \leq 10$  sec.

Pulse Test: Pulse Width  $\leq 300\mu s$ , Duty Cycle  $\leq 2\%$ .

Guaranteed by design, not subject to production



### Typical Characteristics



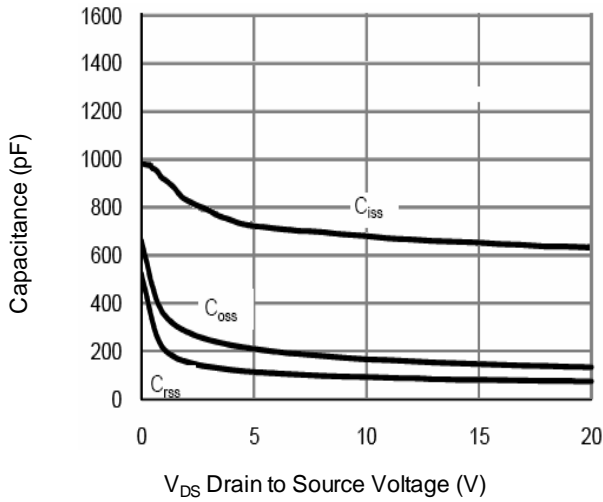


Fig.7 Capacitance

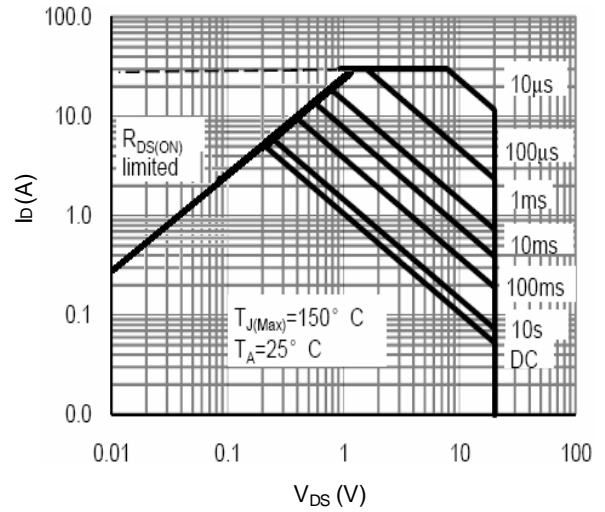


Fig.8 Safe Operating Area

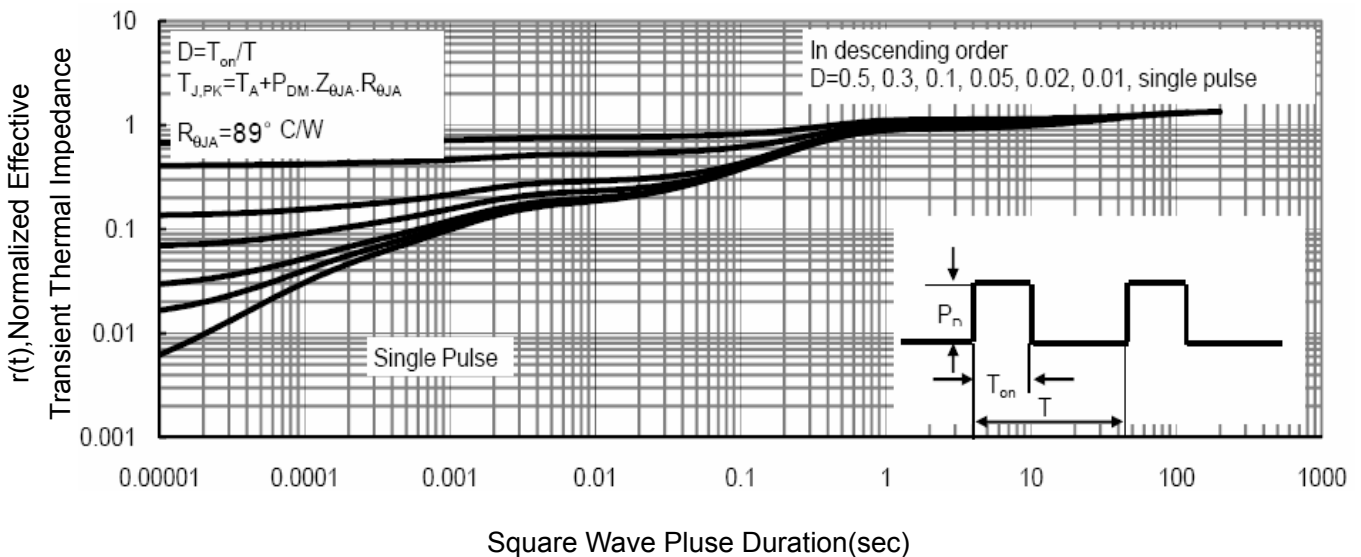


Fig.9 Normalized Maximum Transient Thermal Impedance

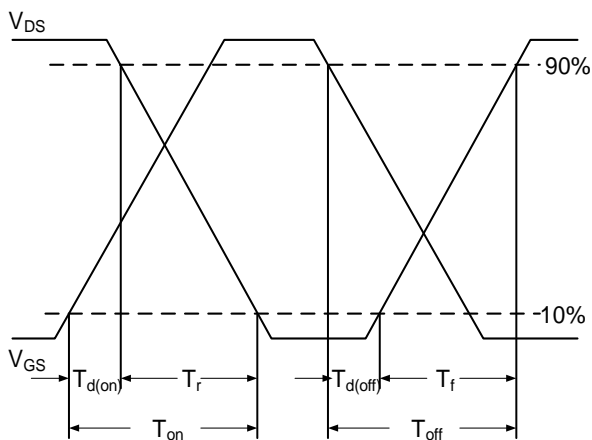


Fig.10 Switching Time Waveform

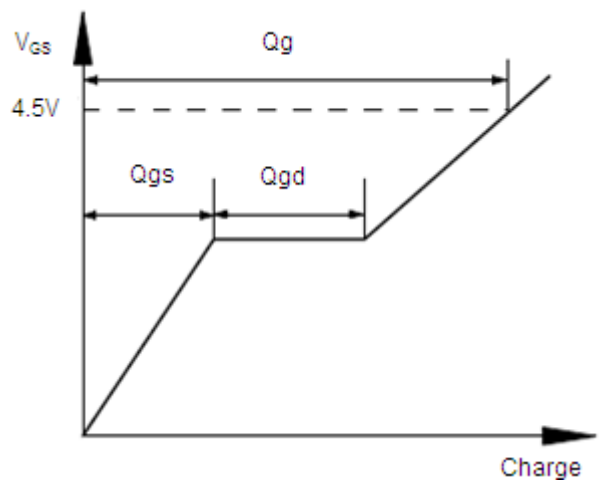
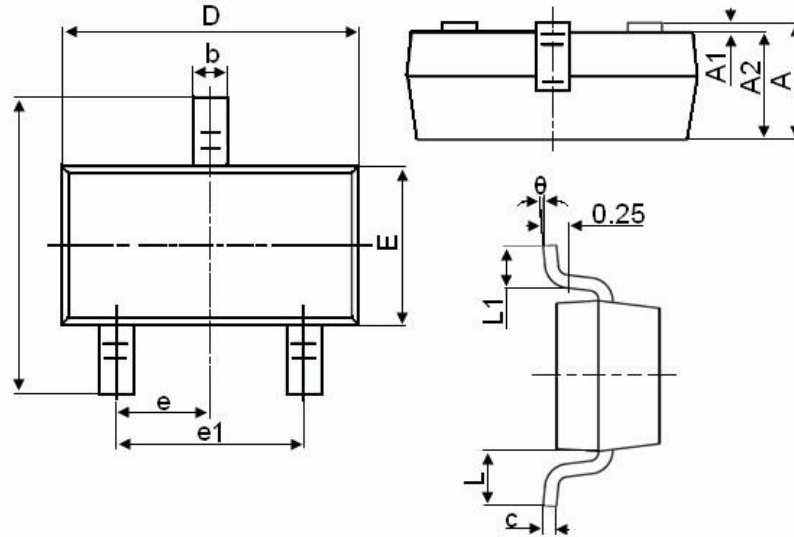


Fig.11 Gate Charge Waveform



**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 |
| $\theta$ | 0°                        | 8°    |



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