



## Description

The JMSH0401AGQ use advanced SGT MOSFET technology to provide low  $R_{DS(ON)}$ , low gate charge, fast switching and excellent avalanche characteristics. This device is specially designed to get better ruggedness and suitable.

## General Features

$V_{DS} = 40V$   $I_D = 219A$

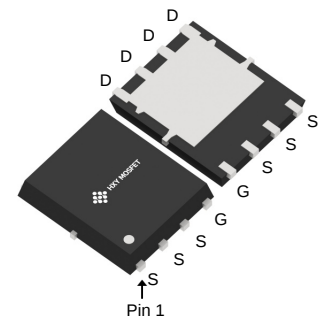
$R_{DS(ON)} < 1.5m\Omega$   $V_{GS}=10V$

## Applications

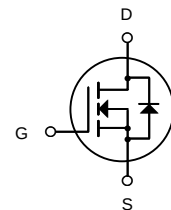
Consumer electronic power supply Motor control

Synchronous-rectification Isolated DC

Synchronous-rectification applications



DFN5X6-8L



N-Channel MOSFET

## Ordering Information

| Product ID  | Pack      | Brand      | Qty(PCS) |
|-------------|-----------|------------|----------|
| JMSH0401AGQ | DFN5X6-8L | HXY MOSFET | 5000     |

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

| Symbol                 | Parameter                                | Rating     | Units         |
|------------------------|------------------------------------------|------------|---------------|
| $V_{DS}$               | Drain-Source Voltage                     | 40         | V             |
| $V_{GS}$               | Gate-Source Voltage                      | $\pm 20$   | V             |
| $I_D@T_c=25^{\circ}C$  | Continuous Drain Current, $V_{GS} @ 10V$ | 219        | A             |
| $I_D@T_c=100^{\circ}C$ | Continuous Drain Current, $V_{GS} @ 10V$ | 138        | A             |
| $I_{DM}$               | Pulsed Drain Current                     | 345        | A             |
| EAS                    | Single Pulse Avalanche Energy            | 69         | mJ            |
| $P_D@T_c=25^{\circ}C$  | Total Power Dissipation                  | 114        | W             |
| $T_{STG}$              | Storage Temperature Range                | -50 to 150 | $^{\circ}C$   |
| $T_J$                  | Operating Junction Temperature Range     | -50 to 150 | $^{\circ}C$   |
| $R_{\theta JA}$        | Thermal Resistance Junction-Ambient      | 43.2       | $^{\circ}C/W$ |
| $R_{\theta JC}$        | Thermal Resistance Junction-Case         | 1.1        | $^{\circ}C/W$ |



### Electrical Characteristics (T<sub>J</sub>=25°C, unless otherwise noted)

| Symbol                                                 | Parameter                          | Conditions                                                              | Min. | Typ. | Max  | Unit |
|--------------------------------------------------------|------------------------------------|-------------------------------------------------------------------------|------|------|------|------|
| Static Characteristics                                 |                                    |                                                                         |      |      |      |      |
| BV <sub>DSS</sub>                                      | Drain Source breakdown voltage     | V <sub>GS</sub> =0V, I <sub>b</sub> =250uA, T <sub>J</sub> =25°C        | 40   | -    | -    | V    |
| I <sub>DSS</sub>                                       | Zero Gate Voltage Drain Current    | V <sub>DS</sub> =40V, V <sub>GS</sub> =0V                               | -    | -    | 1    | uA   |
| I <sub>GSS</sub>                                       | Gate-to-Source Forward Leakage     | V <sub>GS</sub> =±20V, V <sub>DS</sub> =0V                              | -    | -    | ±100 | nA   |
| On Characteristics                                     |                                    |                                                                         |      |      |      |      |
| V <sub>GS(th)</sub>                                    | Gate Threshold Voltage             | V <sub>DS</sub> =V <sub>GS</sub> , I <sub>b</sub> =250uA                | 1.4  | -    | 2.3  | V    |
| R <sub>DS(ON)</sub>                                    | Static Drain-Source On-Resistance  | V <sub>GS</sub> =10V, I <sub>b</sub> =20A                               | -    | 1.2  | 1.5  | mΩ   |
|                                                        |                                    | V <sub>GS</sub> =5V, I <sub>b</sub> =20A                                | -    | 1.7  | 2.2  | mΩ   |
| R <sub>G</sub>                                         | Gate Resistance                    | f = 1 MHz                                                               | -    | 1.5  | -    | Ω    |
| Dynamic Characteristics                                |                                    |                                                                         |      |      |      |      |
| C <sub>iss</sub>                                       | Input Capacitance                  | VGS = 0V<br>VDS = 20V<br>f = 150KHz                                     | -    | 6461 | -    | pF   |
| C <sub>oss</sub>                                       | Output Capacitance                 |                                                                         | -    | 3257 | -    | pF   |
| C <sub>rss</sub>                                       | Reverse Transfer Capacitance       |                                                                         | -    | 196  | -    | pF   |
| Switching Characteristics                              |                                    |                                                                         |      |      |      |      |
| T <sub>D(on)</sub>                                     | Turn-on Delay Time                 | VDD = 20V<br>VGS = 4.5V<br>RG = 3Ω<br>ID = 20A                          | -    | 24   | -    | ns   |
| T <sub>r</sub>                                         | Turn-on Rise Time                  |                                                                         | -    | 84   | -    | ns   |
| T <sub>D(off)</sub>                                    | Turn-off Delay Time                |                                                                         | -    | 62   | -    | ns   |
| T <sub>f</sub>                                         | Turn-off Fall Time                 |                                                                         | -    | 20   | -    | ns   |
| Q <sub>g</sub>                                         | Total Gate Charge                  | V <sub>DD</sub> = 20V<br>V <sub>GS</sub> = 4.5V<br>I <sub>D</sub> = 20A | -    | 55   | -    | nC   |
| Q <sub>gs</sub>                                        | Gate Source Charge                 |                                                                         | -    | 15   | -    | nC   |
| Q <sub>gd</sub>                                        | Gate Drain Charge                  |                                                                         | -    | 19   | -    | nC   |
| Drain-Source Diode Characteristics and Maximum Ratings |                                    |                                                                         |      |      |      |      |
| V <sub>SD</sub>                                        | Drain-Source Diode Forward Voltage | I <sub>S</sub> = 50A, VGS = 0V                                          | -    | 0.8  | 1.2  | V    |
| T <sub>rr</sub>                                        | Reverse Recovery Time              | I <sub>S</sub> = 20A, VGS = 0V<br>di/dt = 100A/μs                       | -    | 171  | -    | ns   |
| Q <sub>rr</sub>                                        | Reverse Recovery Charge            |                                                                         | -    | 381  | -    | nC   |

#### Notes:

1. Rated according to R<sub>θJC</sub>
2. Rated according to R<sub>θJA</sub>
3. Surface mounted on 1 inch<sup>2</sup> FR4 board, 2 oz Cu
4. Limited by maximum T<sub>J</sub>
5. Starting T<sub>J</sub> = 25°C, V<sub>DD</sub> = 30V, V<sub>GS</sub> = 10V, L = 0.5mH
6. Pulse width limited by maximum T<sub>J</sub>



## Typical Characteristics

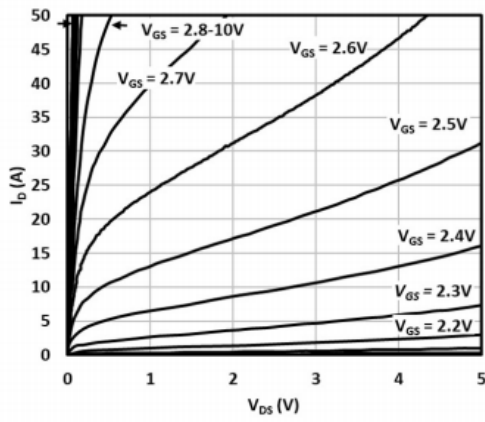


Fig. 1 Output characteristics

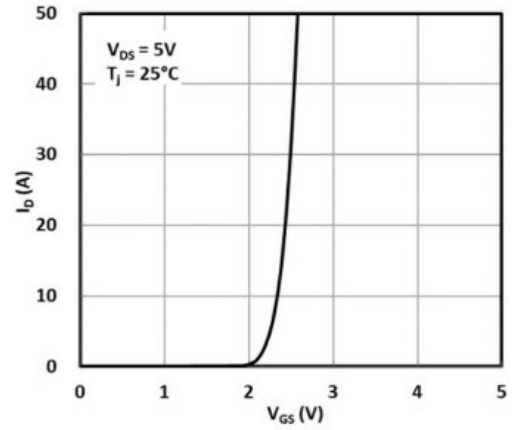


Fig. 2 Transfer characteristics

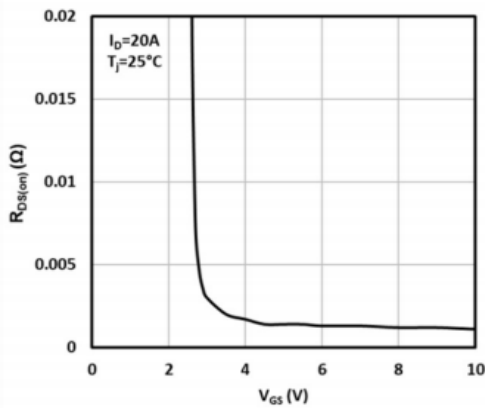


Fig.3 On-resistance vs. gate voltage

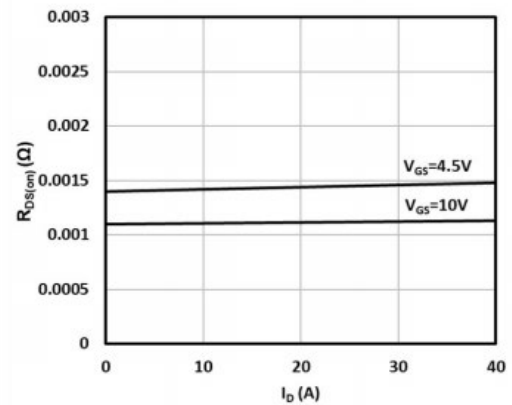


Fig.4 On-resistance vs. drain current

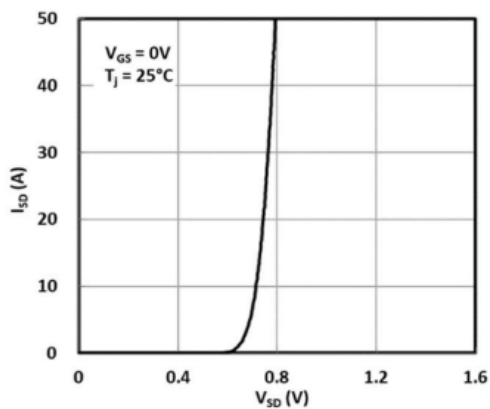


Fig.5 Source-to-drain diode forward characteristics

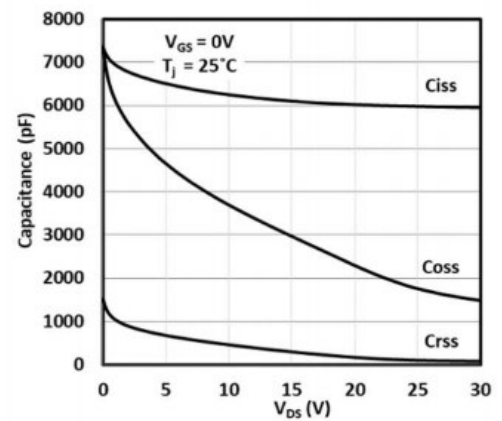


Fig.6 Capacitance vs. drain-to-source voltage

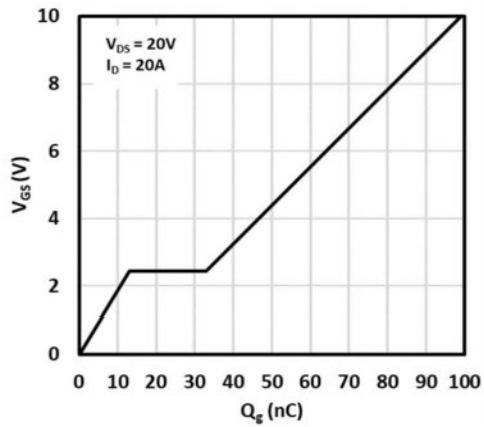


Fig.7 Gate-to-source voltage vs. gate charge

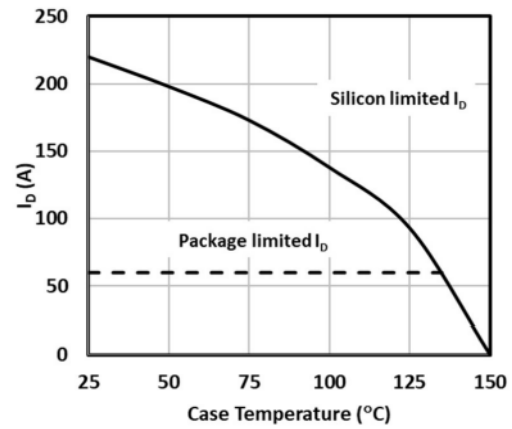


Fig.8 Maximum drain current vs. case temperature

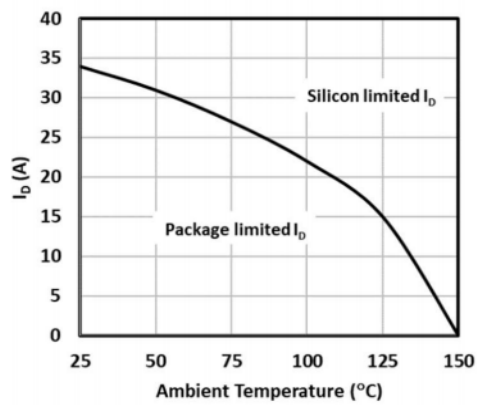
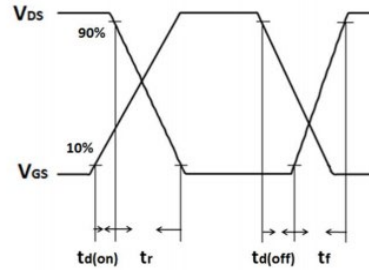
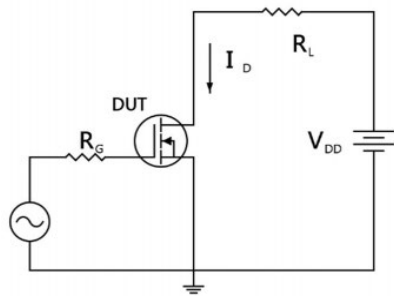


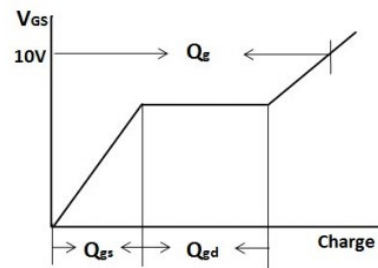
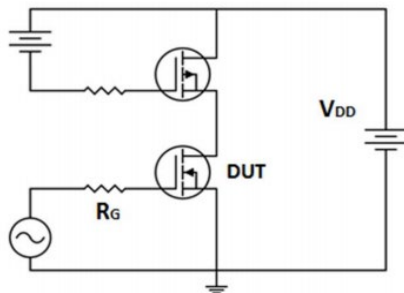
Fig. 9 Maximum drain current vs. ambient temperature



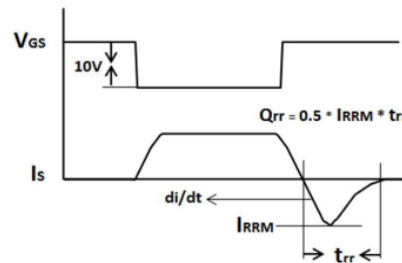
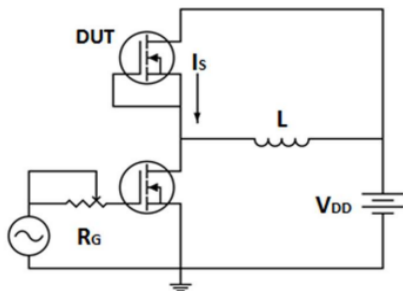
## Test Circuits and Waveforms



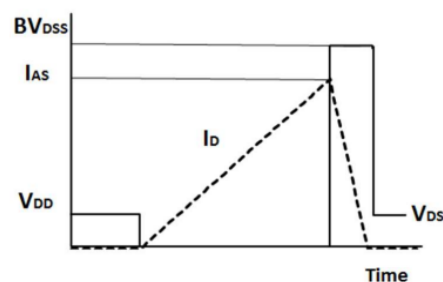
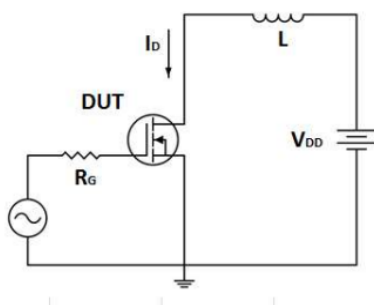
Resistive switching time test circuit & waveforms



Gate charge test circuit & waveform



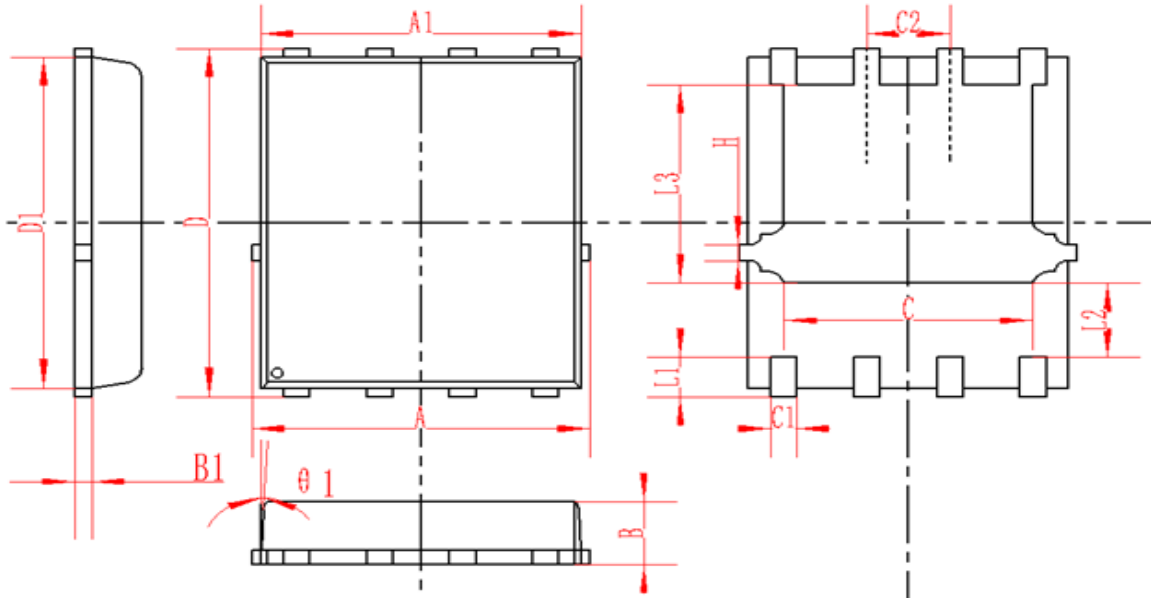
Peak diode recovery dv/dt test circuit & waveforms



Unclamped inductive switching test circuit & waveforms



## DFN5X6-8L Package Information



| SYMBOL | MM       |      |       | INCH     |       |       |
|--------|----------|------|-------|----------|-------|-------|
|        | MIN      | NOM  | MAX   | MIN      | NOM   | MAX   |
| A      | 4.95     | 5    | 5.05  | 0.195    | 0.197 | 0.199 |
| A1     | 4.82     | 4.9  | 4.98  | 0.190    | 0.193 | 0.196 |
| D      | 5.98     | 6    | 6.02  | 0.235    | 0.236 | 0.237 |
| D1     | 5.67     | 5.75 | 5.83  | 0.223    | 0.226 | 0.230 |
| B      | 0.9      | 0.95 | 1     | 0.035    | 0.037 | 0.039 |
| B1     | 0.254REF |      |       | 0.010REF |       |       |
| C      | 3.95     | 4    | 4.05  | 0.156    | 0.157 | 0.159 |
| C1     | 0.35     | 0.4  | 0.45  | 0.014    | 0.016 | 0.018 |
| C2     | 1.27TYP  |      |       | 0.5TYP   |       |       |
| θ1     | 8°       | 10°  | 12°   | 8°       | 10°   | 12°   |
| L1     | 0.63     | 0.64 | 0.65  | 0.025    | 0.025 | 0.026 |
| L2     | 1.2      | 1.3  | 1.4   | 0.047    | 0.051 | 0.055 |
| L3     | 3.415    | 3.42 | 3.425 | 0.134    | 0.135 | 0.135 |
| H      | 0.24     | 0.25 | 0.26  | 0.009    | 0.010 | 0.010 |



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