# GT6924E

**N-CHANNEL MOSFET WITH SCHOTTKY DIODE**

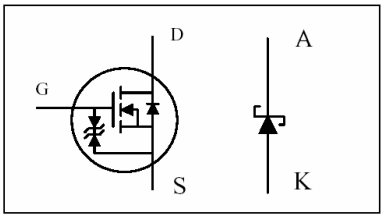
| | |
|---|---|
| $BV_{DSS}$ | 20V |
| $R_{DS(ON)}$ | 600mΩ |
| $I_D$ | 1A |

## Description

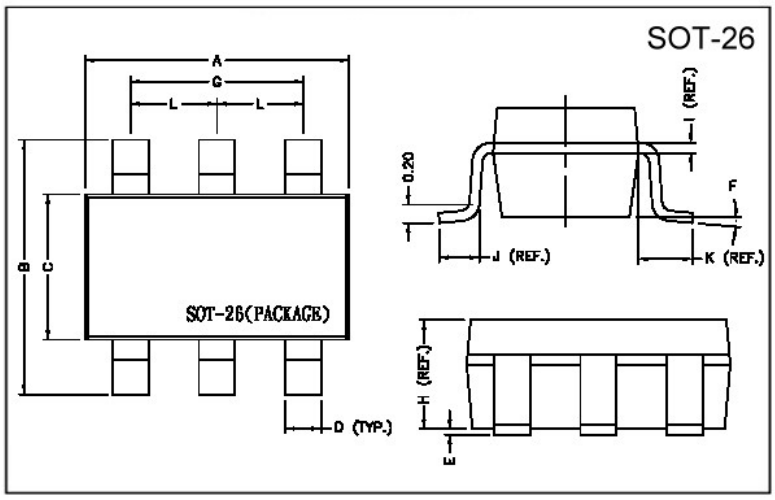
The GM2306 provide the designer with the best combination of fast switching, ruggedized device design, low on-resistance and cost-effectiveness.

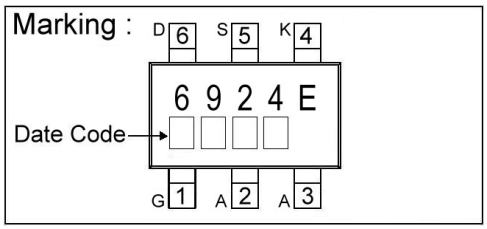
## Features

*Lower on-resistance
*Fast Switching Characteristic
*Included Schottky Diode




## Package Dimensions




| REF. | Millimeter | | REF. | Dimensions |
|---|---|---|---|---|
| | Min. | Max. | | Millimeter |
| A | 2.70 | 3.10 | G | 1.90 REF. |
| B | 2.60 | 3.00 | H | 1.20 REF. |
| C | 1.40 | 1.80 | I | 0.12 REF. |
| D | 0.30 | 0.55 | J | 0.37 REF. |
| E | 0 | 0.10 | K | 0.60 REF. |
| F | 0° | 10° | L | 0.95 REF. |

## Absolute Maximum Ratings

| Parameter | Symbol | Ratings | Unit |
|---|---|---|---|
| Drain-Source Voltage (MOSFET) | $V_{DS}$ | 20 | V |
| Gate-Source Voltage (MOSFET) | $V_{GS}$ | ± 6 | V |
| Continuous Drain Current[3] (MOSFET) | $I_D$ @$T_A$=25℃ | 1.0 | A |
| Continuous Drain Current[3] (MOSFET) | $I_D$ @$T_A$=70℃ | 0.8 | A |
| Pulsed Drain Current[1] (MOSFET) | $I_{DM}$ | 8 | A |
| Reverse Voltage (Schottky) | $V_{KA}$ | 20 | V |
| Average Forward Current (Schottky) | $I_F$ | 0.5 | A |
| Pulsed Forward Current[1] (Schottky) | $I_{FM}$ | 2.0 | A |
| Total Power Dissipation (MOSFET) | $P_D$ @$T_A$=25℃ | 0.9 | W |
| Total Power Dissipation (Schottky) | | 0.9 | W |
| Operating Junction and Storage Temperature Range | Tj, Tstg | -55 ~ +125 | ℃ |

## Thermal Data

| Parameter | Symbol | Value | Unit |
|---|---|---|---|
| Thermal Resistance Junction-ambient[3] (MOSFET) Max. | Rthj-a | 110 | ℃/W |
| Thermal Resistance Junction-ambient[3] (Schottky) Max. | | 110 | ℃/W |

## Electrical Characteristics (Tj = 25℃ unless otherwise specified)

| Parameter | Symbol | Min. | Typ. | Max. | Unit | Test Conditions |
|---|---|---|---|---|---|---|
| Drain-Source Breakdown Voltage | $BV_{DSS}$ | 20 | - | - | V | $V_{GS}$=0, $I_D$=250uA |
| Breakdown Voltage Temperature Coefficient | $\triangle BV_{DSS}/\triangle Tj$ | - | 0.02 | - | V/℃ | Reference to 25℃, $I_D$=1mA |
| Gate Threshold Voltage | $V_{GS(th)}$ | 0.5 | - | 1.2 | V | $V_{DS}$=$V_{GS}$, $I_D$=250uA |
| Forward Transconductance | $g_{fs}$ | - | 1 | - | S | $V_{DS}$=5V, $I_D$=600mA |
| Gate-Source Leakage Current | $I_{GSS}$ | - | - | ±10 | uA | $V_{GS}$= ± 6V |
| Drain-Source Leakage Current(Tj=25℃) | $I_{DSS}$ | - | - | 1 | uA | $V_{DS}$=20V, $V_{GS}$=0 |
| Drain-Source Leakage Current(Tj=70℃) | | - | - | 10 | uA | $V_{DS}$=16V, $V_{GS}$=0 |
| Static Drain-Source On-Resistance | $R_{DS(ON)}$ | - | - | 600 | mΩ | $V_{GS}$=4.5V, $I_D$=1A |
| | | - | - | 850 | | $V_{GS}$=2.5V, $I_D$=0.5A |
| Total Gate Charge[2] | $Q_g$ | - | 1.3 | 2 | nC | $I_D$=600mA<br>$V_{DS}$=16V<br>$V_{GS}$=4.5V |
| Gate-Source Charge | $Q_{gs}$ | - | 0.3 | - | | |
| Gate-Drain (“Miller”) Change | $Q_{gd}$ | - | 0.5 | - | | |
| Turn-on Delay Time[2] | $T_{d(on)}$ | - | 21 | - | Ns | $V_{DS}$=10V<br>$I_D$=600mA<br>$V_{GS}$=5V<br>$R_G$=3.3Ω<br>$R_D$=16.7Ω |
| Rise Time | $T_r$ | - | 53 | - | | |
| Turn-off Delay Time | $T_{d(off)}$ | - | 100 | - | | |
| Fall Time | $T_f$ | - | 125 | - | | |
| Input Capacitance | $C_{iss}$ | - | 38 | 60 | pF | $V_{GS}$=0V<br>$V_{DS}$=10V<br>f=1.0MHz |
| Output Capacitance | $C_{oss}$ | - | 17 | - | | |
| Reverse Transfer Capacitance | $C_{rss}$ | - | 12 | - | | |

## Source-Drain Diode

| Parameter | Symbol | Min. | Typ. | Max. | Unit | Test Conditions |
|---|---|---|---|---|---|---|
| Forward On Voltage[2] | $V_{SD}$ | - | - | 1.2 | V | $I_S$=750mA, $V_{GS}$=0V |

## Schottky Characteristics (Tj = 25℃)

| Parameter | Symbol | Min. | Typ. | Max. | Unit | Test Conditions |
|---|---|---|---|---|---|---|
| Forward Voltage Drop | $V_F$ | - | - | 0.5 | V | $I_F$=500mA |
| Maximum Reverse Leakage Current | $I_{RM}$ | - | - | 100 | uA | $V_R$=20V |
| Junction Capacitance | $C_T$ | - | 21 | - | pF | $V_R$=10V |

Notes: 1. Pulse width limited by Max. junction temperature.

2. Pulse width≦300us, duty cycle≦2%.

3. Surface mounted on 1 $in^2$ copper pad of FR4 board, t≦5sec; 180℃/W when mounted on Min. copper pad.

## MOSFET Characteristics Curve

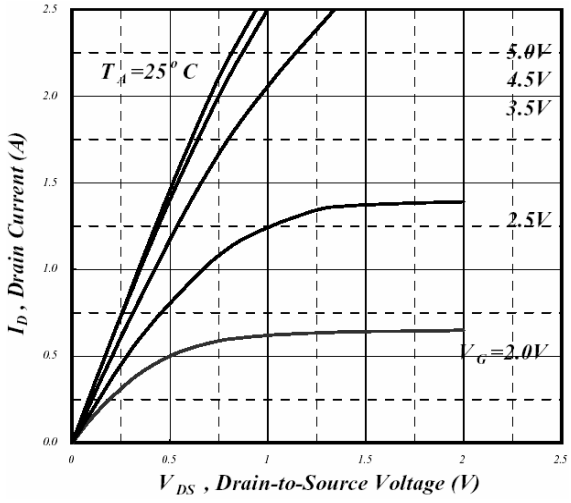



**Fig 1. Typical Output Characteristics**

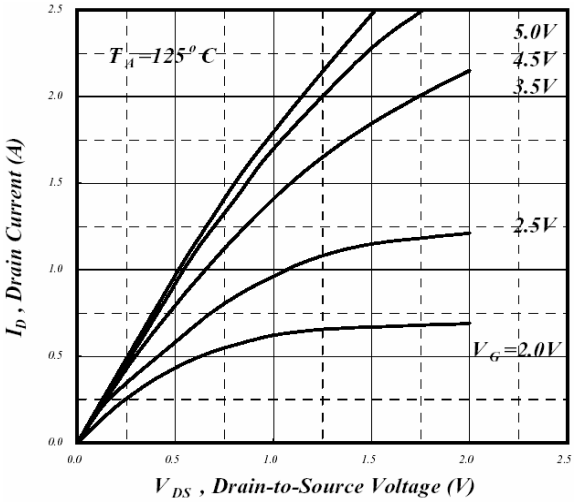



**Fig 2. Typical Output Characteristics**

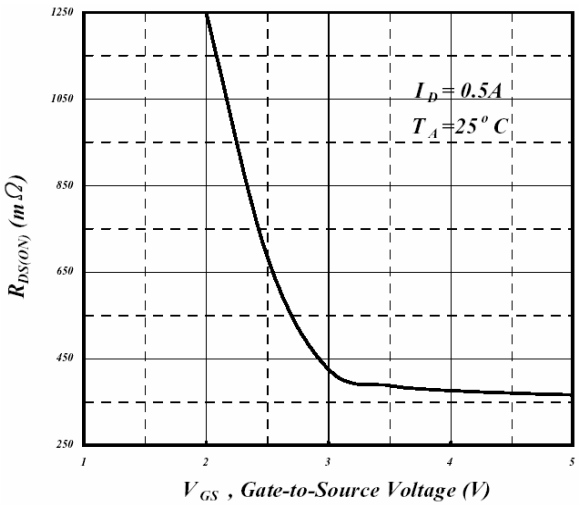



**Fig 3. On-Resistance v.s. Gate Voltage**

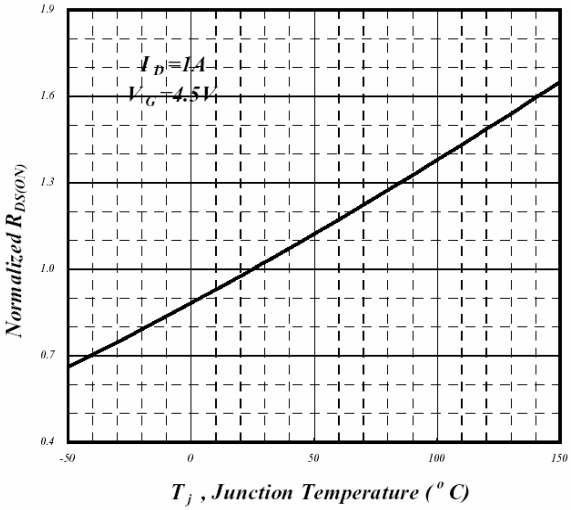



**Fig 4. Normalized On-Resistance v.s. Junction Temperature**

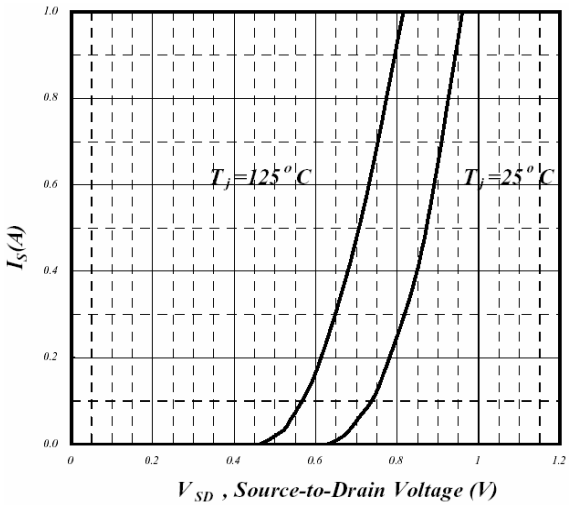



**Fig 5. Forward Characteristics of Reverse Diode**

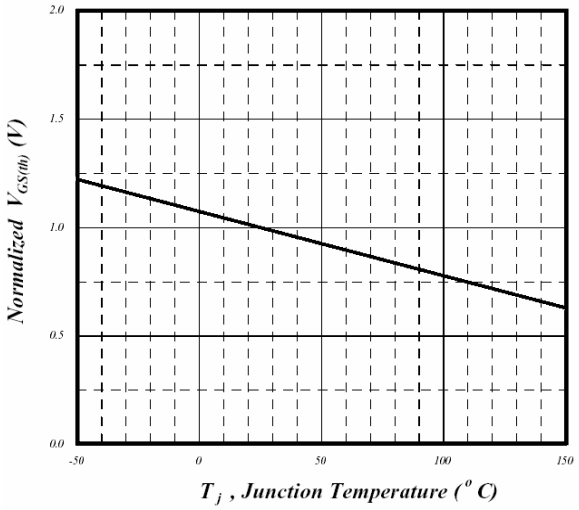



**Fig 6. Gate Threshold Voltage v.s. Junction Temperature**

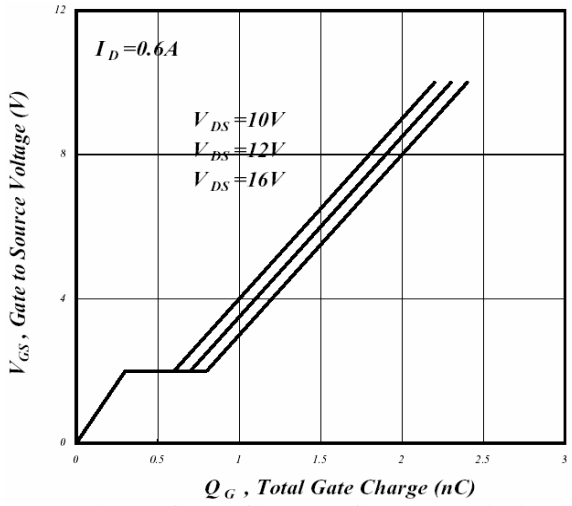



**Fig 7. Gate Charge Characteristics**

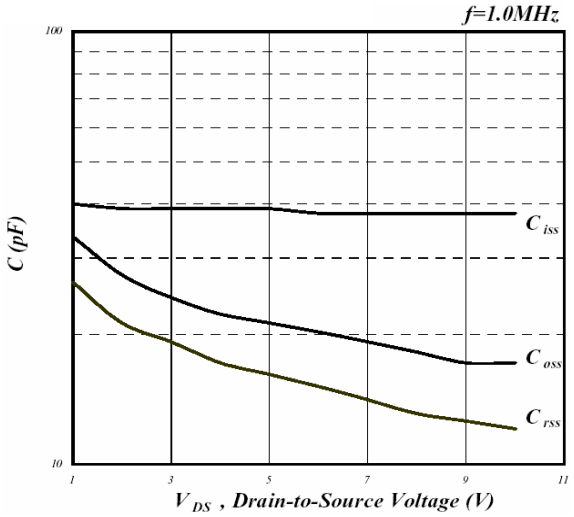



**Fig 8. Typical Capacitance Characteristics**

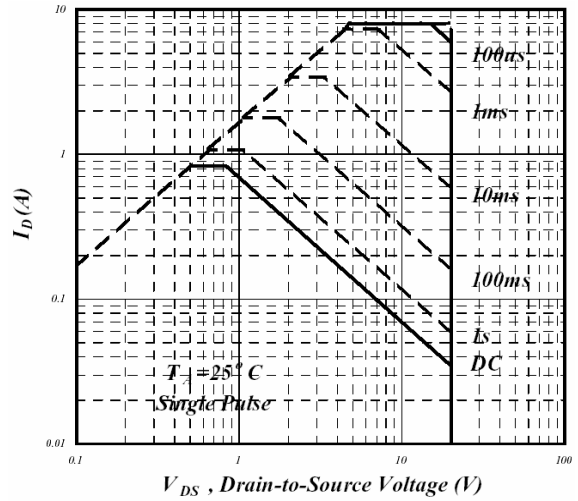



**Fig 9. Maximum Safe Operating Area**

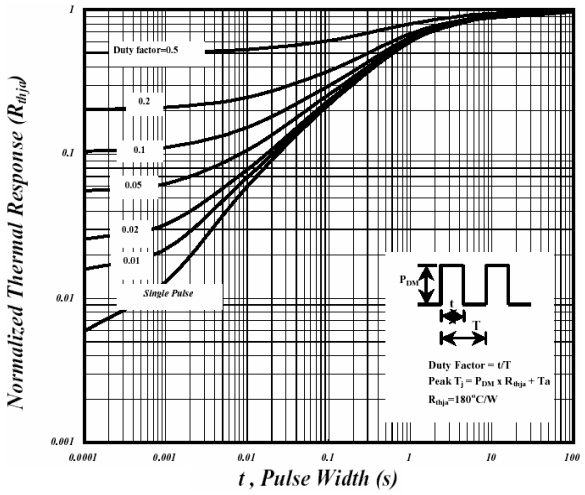



**Fig 10. Effective Transient Thermal Impedance**

## Schottky Diode Characteristics Curve

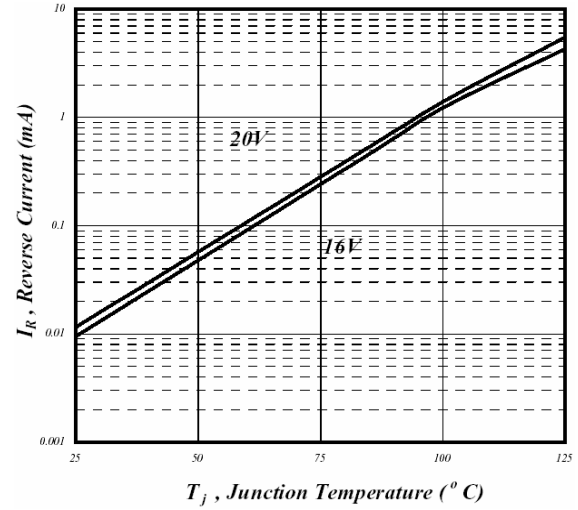



**Fig 1. Reverse Leakage Current v.s. Junction Temperature**

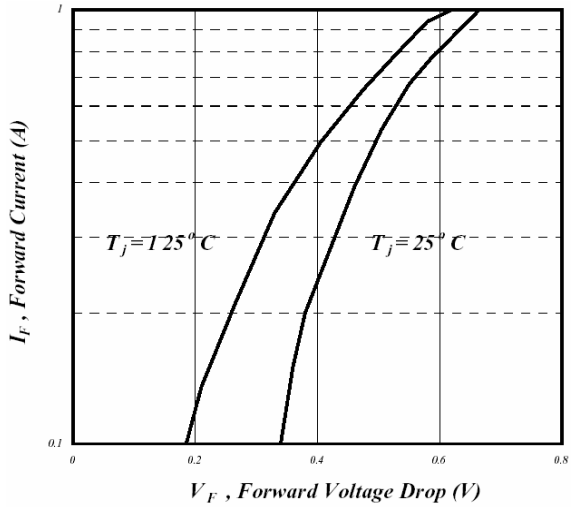



**Fig 12. Forward Voltage Drop**



***Head Office And Factory:***
- **Taiwan**: No. 17-1 Tatung Rd. Fu Kou Hsin-Chu Industrial Park, Hsin-Chu, Taiwan, R. O. C.
  TEL : 886-3-597-7061 FAX : 886-3-597-9220, 597-0785
- **China**: (201203) No.255, Jang-Jiang Tsai-Lueng RD. , Pu-Dung-Hsin District, Shang-Hai City, China
  TEL : 86-21-5895-7671 ~ 4 FAX : 86-21-38950165