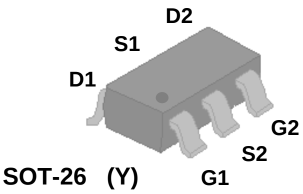
**Advanced Power**
**Electronics Corp.**

# AP2530GY-HF-3

## Complementary N and P-channel Enhancement-mode Power MOSFETs

- **Low Gate Charge**
- **Low On-resistance**
- **Fast Switching Performance**
- **RoHS-compliant, halogen-free**

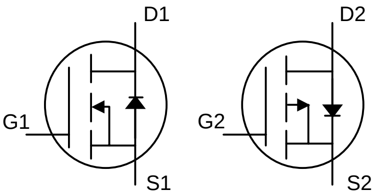


| | | |
|---|---|---|
| N-CH | $BV_{DSS}$ | 30V |
| | $R_{DS(ON)}$ | 72mΩ |
| | $I_D$ | 3.3A |
| P-CH | $BV_{DSS}$ | -30V |
| | $R_{DS(ON)}$ | 150mΩ |
| | $I_D$ | -2.3A |

## Description

Advanced Power MOSFETs from APEC provide the designer with the best combination of fast switching, low on-resistance and cost-effectiveness.

The AP2530GY-HF-3 is in a standard SOT-26 package, which is widely used for commercial and industrial surface-mount applications, and is well suited for applications such as small DC and servo motor drives.



## Absolute Maximum Ratings

| Symbol | Parameter | Rating | | Units |
|---|---|---|---|---|
| | | N-channel | P-channel | |
| $V_{DS}$ | Drain-Source Voltage | 30 | -30 | V |
| $V_{GS}$ | Gate-Source Voltage | ±20 | ±20 | V |
| $I_D$ at $T_A$=25°C | Continuous Drain Current[3] | 3.3 | -2.3 | A |
| $I_D$ at $T_A$=70°C | Continuous Drain Current[3] | 2.6 | -1.8 | A |
| $I_{DM}$ | Pulsed Drain Current[1] | 10 | -10 | A |
| $P_D$ at $T_A$=25°C | Total Power Dissipation | 1.14 | | W |
| | Linear Derating Factor | 0.01 | | W/°C |
| $T_{STG}$ | Storage Temperature Range | -55 to 150 | | °C |
| $T_J$ | Operating Junction Temperature Range | -55 to 150 | | °C |

## Thermal Data

| Symbol | Parameter | Value | Unit |
|---|---|---|---|
| Rthj-a | Maximum Thermal Resistance, Junction-ambient[3] | 110 | °C/W |

## Ordering Information

**AP2530GY-HF-3TR : in RoHS-compliant, halogen-free SOT-26, shipped on tape and reel (3000 pcs/reel)**

## N-channel Electrical Specifications at $T_j$=25°C (unless otherwise specified)

| Symbol | Parameter | Test Conditions | Min. | Typ. | Max. | Units |
|---|---|---|---|---|---|---|
| $BV_{DSS}$ | Drain-Source Breakdown Voltage | $V_{GS}$=0V, $I_D$=250µA | 30 | - | - | V |
| $\Delta BV_{DSS}/\Delta T_j$ | Breakdown Voltage Temperature Coefficient | Reference to 25°C, $I_D$=1mA | - | 0.02 | - | V/°C |
| $R_{DS(ON)}$ | Static Drain-Source On-Resistance[2] | $V_{GS}$=10V, $I_D$=3A | - | - | 72 | mΩ |
| | | $V_{GS}$=4.5V, $I_D$=2A | - | - | 125 | mΩ |
| $V_{GS(th)}$ | Gate Threshold Voltage | $V_{DS}$=$V_{GS}$, $I_D$=250µA | 1 | - | 3 | V |
| $g_{fs}$ | Forward Transconductance | $V_{DS}$=5V, $I_D$=3A | - | 4 | - | S |
| $I_{DSS}$ | Drain-Source Leakage Current | $V_{DS}$=30V, $V_{GS}$=0V | - | - | 1 | µA |
| | Drain-Source Leakage Current ($T_j$=70°C) | $V_{DS}$=24V, $V_{GS}$=0V | - | - | 25 | µA |
| $I_{GSS}$ | Gate-Source Leakage | $V_{GS}$=±20V, $V_{DS}$=0V | - | - | ±100 | nA |
| $Q_g$ | Total Gate Charge[2] | $I_D$=3A | - | 3 | 5 | nC |
| $Q_{gs}$ | Gate-Source Charge | $V_{DS}$=25V | - | 1 | - | nC |
| $Q_{gd}$ | Gate-Drain ("Miller") Charge | $V_{GS}$=4.5V | - | 2 | - | nC |
| $t_{d(on)}$ | Turn-on Delay Time[2] | $V_{DS}$=15V | - | 6 | - | ns |
| $t_r$ | Rise Time | $I_D$=1A | - | 8 | - | ns |
| $t_{d(off)}$ | Turn-off Delay Time | $R_G$=3.3Ω, $V_{GS}$=10V | - | 11 | - | ns |
| $t_f$ | Fall Time | $R_D$=15Ω | - | 2 | - | ns |
| $C_{iss}$ | Input Capacitance | $V_{GS}$=0V | - | 170 | 270 | pF |
| $C_{oss}$ | Output Capacitance | $V_{DS}$=25V | - | 50 | - | pF |
| $C_{rss}$ | Reverse Transfer Capacitance | f=1.0MHz | - | 35 | - | pF |
| $R_g$ | Gate Resistance | f=1.0MHz | - | 0.5 | 0.8 | Ω |

## Source-Drain Diode

| Symbol | Parameter | Test Conditions | Min. | Typ. | Max. | Units |
|---|---|---|---|---|---|---|
| $V_{SD}$ | Forward On Voltage[2] | $I_S$=0.9A, $V_{GS}$=0V | - | - | 1.3 | V |
| $t_{rr}$ | Reverse Recovery Time[2] | $I_S$=3A, $V_{GS}$=0V | - | 14 | - | ns |
| $Q_{rr}$ | Reverse Recovery Charge | dI/dt=100A/µs | - | 7 | - | nC |

**Notes:**

1.Pulse width limited by maximum junction temperature.

2.Pulse width ≤300us, duty cycle ≤ 2%.

3.Surface mounted on 1 in$^2$ copper pad of FR4 board, t ≤10sec; 180°C/W when mounted on min. copper pad.

## P-channel Electrical Specifications at $T_j$=25°C (unless otherwise specified)

| Symbol | Parameter | Test Conditions | Min. | Typ. | Max. | Unit |
|---|---|---|---|---|---|---|
| $BV_{DSS}$ | Drain-Source Breakdown Voltage | $V_{GS}$=0V, $I_D$=-250µA | -30 | - | - | V |
| $\Delta BV_{DSS}/\Delta Tj$ | Breakdown Voltage Temperature Coefficient | Reference to 25°C, $I_D$=-1mA | - | 0.03 | - | V/°C |
| $R_{DS(ON)}$ | Static Drain-Source On-Resistance[2] | $V_{GS}$=-10V, $I_D$=-2A | - | - | 150 | mΩ |
| | | $V_{GS}$=-4.5V, $I_D$=-1A | - | - | 280 | mΩ |
| $V_{GS(th)}$ | Gate Threshold Voltage | $V_{DS}$=$V_{GS}$, $I_D$=-250µA | -1 | - | -3 | V |
| $g_{fs}$ | Forward Transconductance | $V_{DS}$=-5V, $I_D$=-2A | - | 2 | - | S |
| $I_{DSS}$ | Drain-Source Leakage Current | $V_{DS}$=-30V, $V_{GS}$=0V | - | - | -1 | uA |
| | Drain-Source Leakage Current ($T_j$=70°C) | $V_{DS}$=-24V ,$V_{GS}$=0V | - | - | -25 | uA |
| $I_{GSS}$ | Gate-Source Leakage | $V_{GS}$=±20V, $V_{DS}$=0V | - | - | ±100 | nA |
| $Q_g$ | Total Gate Charge[2] | $I_D$=-2A<br>$V_{DS}$=-25V<br>$V_{GS}$=-4.5V | - | 3 | 5 | nC |
| $Q_{gs}$ | Gate-Source Charge | | - | 1 | - | nC |
| $Q_{gd}$ | Gate-Drain ("Miller") Charge | | - | 2 | - | nC |
| $t_{d(on)}$ | Turn-on Delay Time[2] | $V_{DS}$=-15V<br>$I_D$=-1A<br>$R_G$=3.3Ω , $V_{GS}$=-5V<br>$R_D$=15Ω | - | 6 | - | ns |
| $t_r$ | Rise Time | | - | 8 | - | ns |
| $t_{d(off)}$ | Turn-off Delay Time | | - | 17 | - | ns |
| $t_f$ | Fall Time | | - | 4 | - | ns |
| $C_{iss}$ | Input Capacitance | $V_{GS}$=0V<br>$V_{DS}$=-25V<br>f=1.0MHz | - | 150 | 240 | pF |
| $C_{oss}$ | Output Capacitance | | - | 50 | - | pF |
| $C_{rss}$ | Reverse Transfer Capacitance | | - | 40 | - | pF |
| $R_g$ | Gate Resistance | f=1.0MHz | - | 8 | 12 | Ω |

## Source-Drain Diode

| Symbol | Parameter | Test Conditions | Min. | Typ. | Max. | Unit |
|---|---|---|---|---|---|---|
| $V_{SD}$ | Forward On Voltage[2] | $I_S$=-0.9A, $V_{GS}$=0V | - | - | -1.3 | V |
| $t_{rr}$ | Reverse Recovery Time[2] | $I_S$=2A, $V_{GS}$=0V,<br>dI/dt=100A/µs | - | 15 | - | ns |
| $Q_{rr}$ | Reverse Recovery Charge | | - | 7 | - | nC |

## Notes:

1.Pulse width limited by maximum junction temperature.

2.Pulse width≤300us, duty cycle≤ 2%.

3.Surface mounted on 1 in$^2$ copper pad of FR4 board, t ≤10sec; 180°C/W when mounted on min. copper pad.

## Typical N-channel Electrical Characteristics

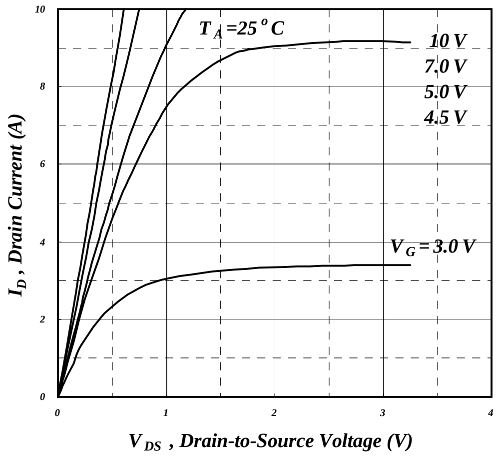


Fig 1. Typical Output Characteristics

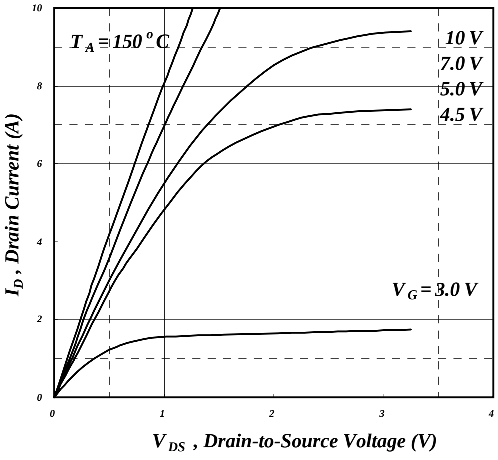


Fig 2. Typical Output Characteristics

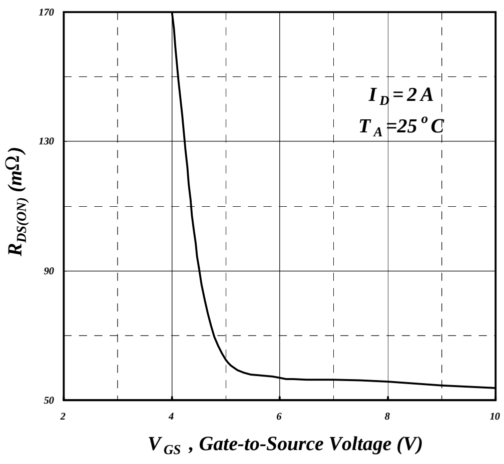


Fig 3. On-Resistance vs. Gate Voltage

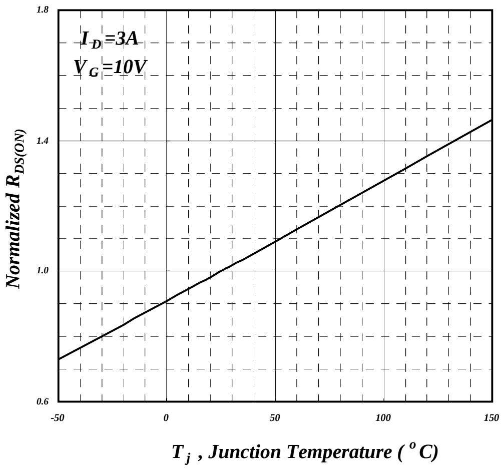


Fig 4. Normalized On-Resistance
vs. Junction Temperature

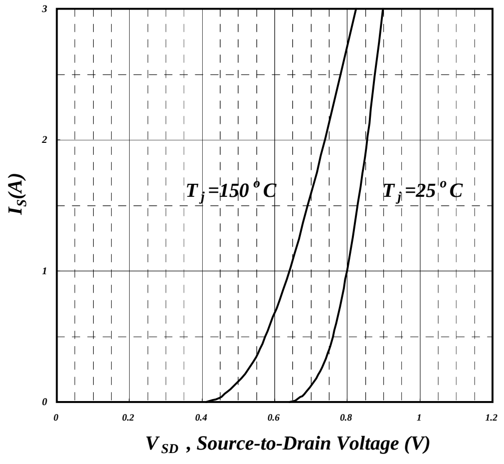


Fig 5. Forward Characteristic of
Reverse Diode

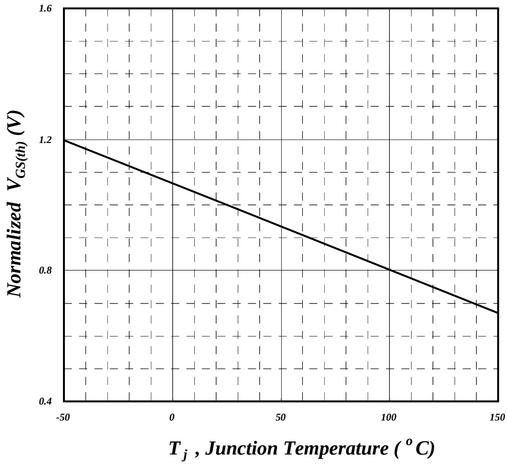


Fig 6. Gate Threshold Voltage vs.
Junction Temperature

## Typical N-channel Electrical Characteristics (cont.)

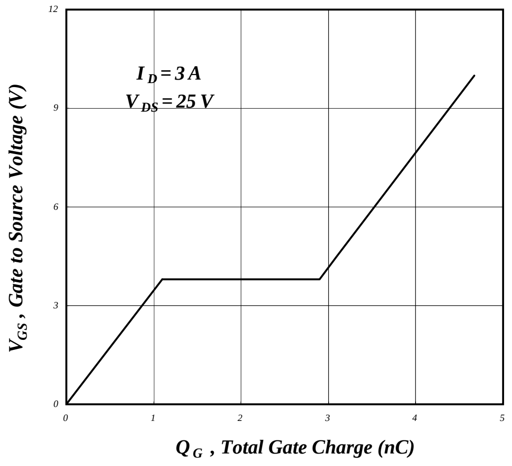


Fig 7. Gate Charge Characteristics

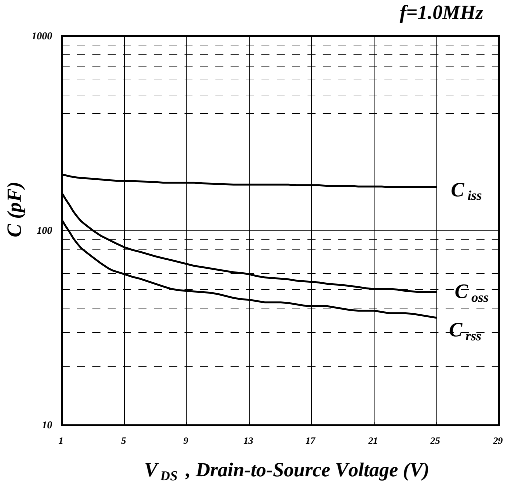


Fig 8. Typical Capacitance Characteristics

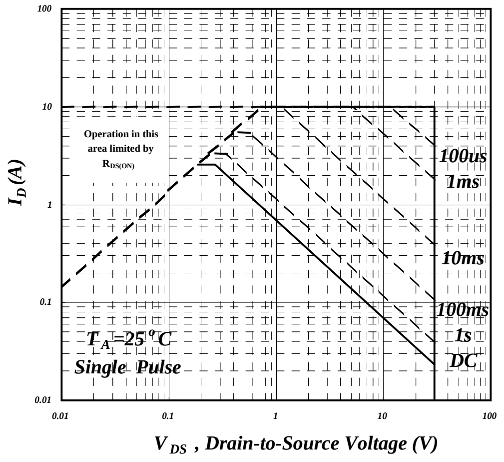


Fig 9. Maximum Safe Operating Area

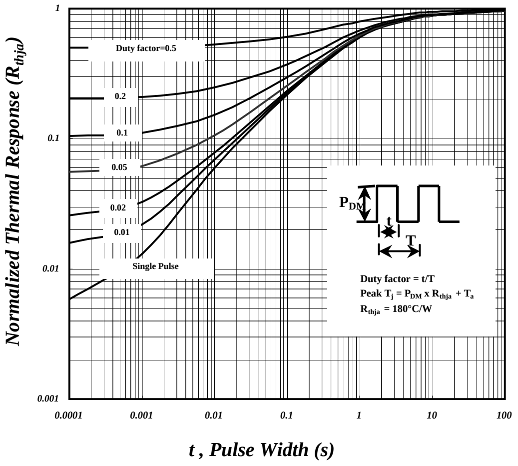


Fig 10. Effective Transient Thermal Impedance

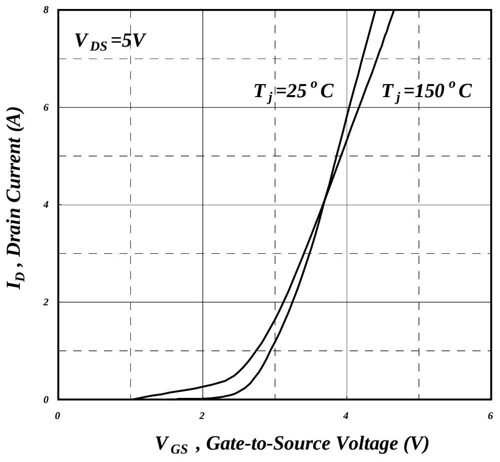


Fig 11. Transfer Characteristics

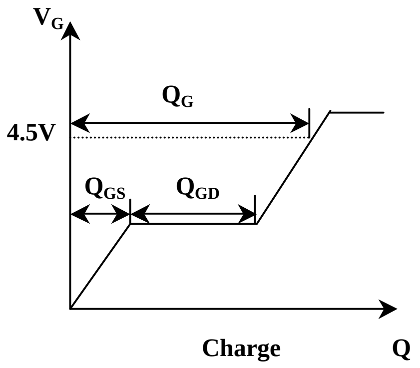


Fig 12. Gate Charge Waveform

## Typical P-channel Electrical Characteristics

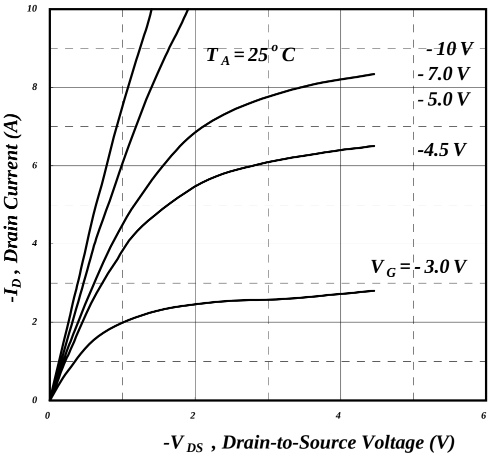


Fig 1. Typical Output Characteristics

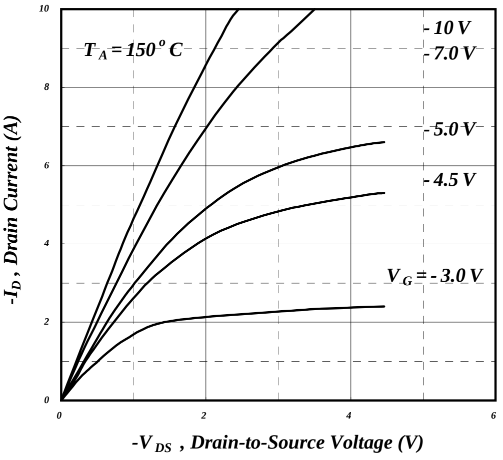


Fig 2. Typical Output Characteristics

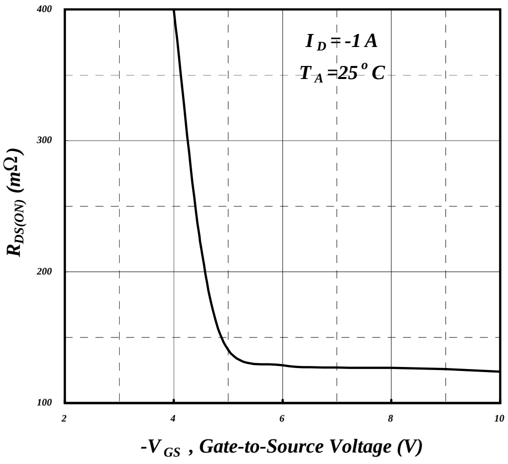


Fig 3. On-Resistance vs. Gate Voltage

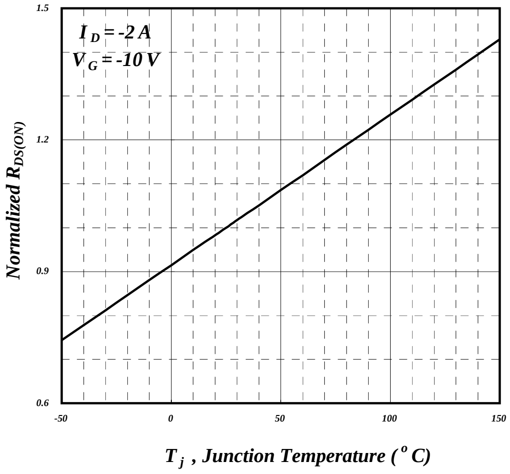


Fig 4. Normalized On-Resistance vs. Junction Temperature

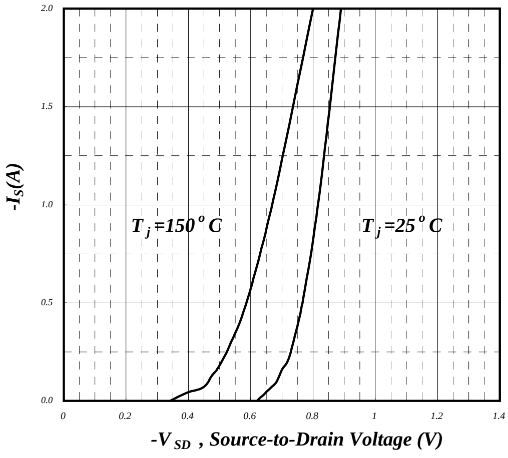


Fig 5. Forward Characteristic of Reverse Diode

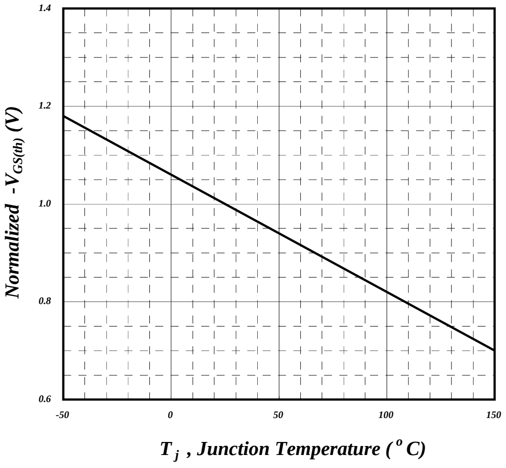


Fig 6. Gate Threshold Voltage vs. Junction Temperature

## Typical P-channel Electrical Characteristics (cont.)

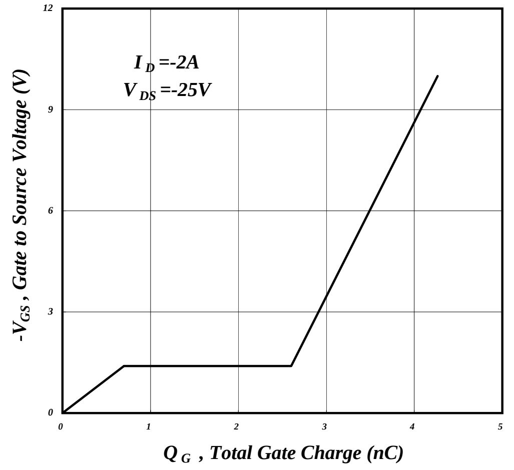


Fig 7. Gate Charge Characteristics

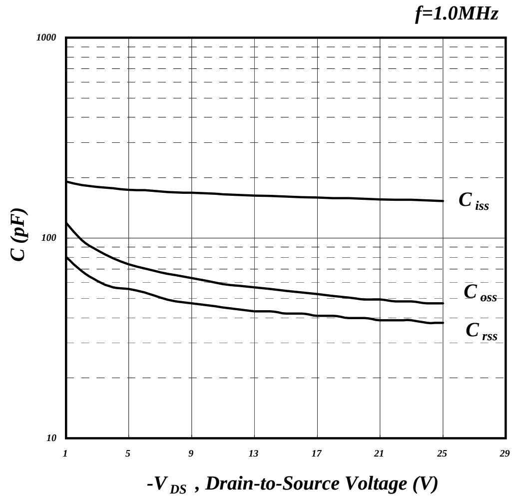


Fig 8. Typical Capacitance Characteristics

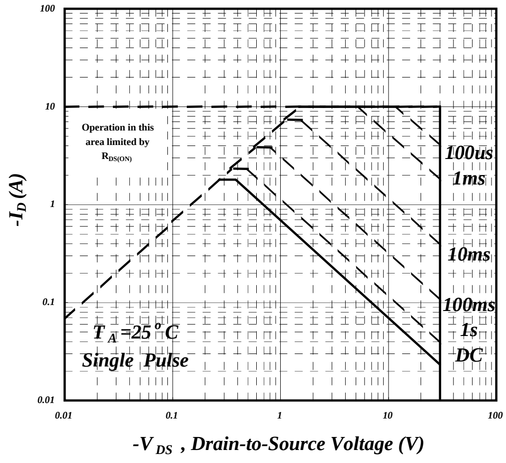


Fig 9. Maximum Safe Operating Area

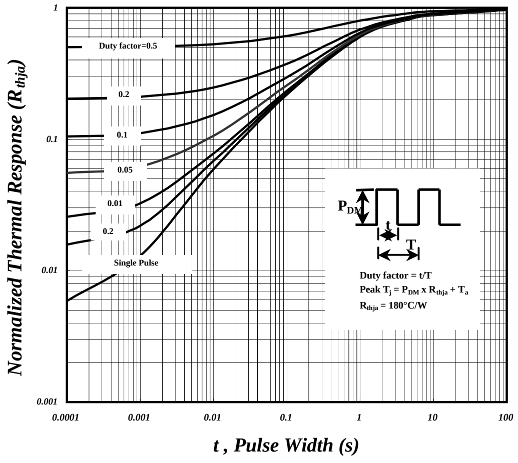


Fig 10. Effective Transient Thermal Impedance

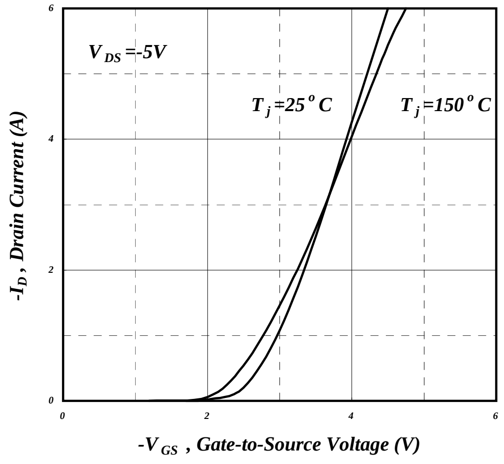


Fig 11. Transfer Characteristics

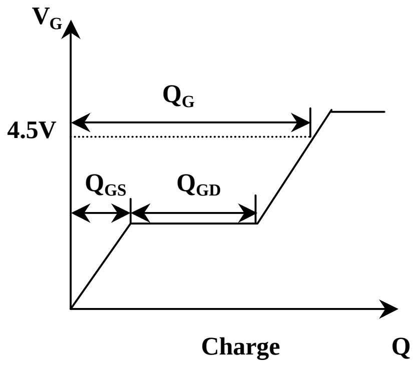
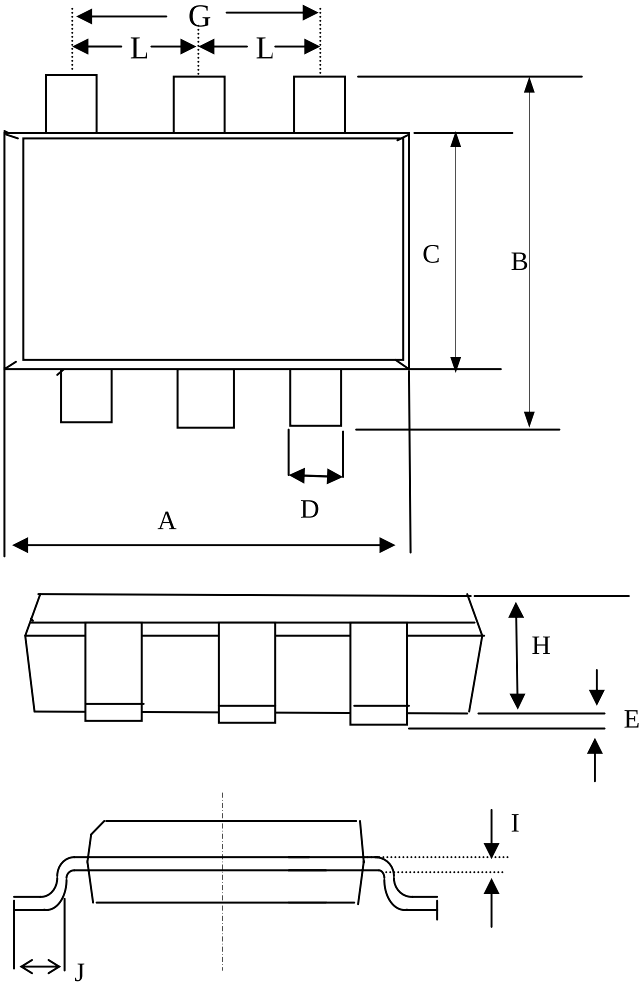


Fig 12. Gate Charge Waveform

## Package Dimensions: SOT-26

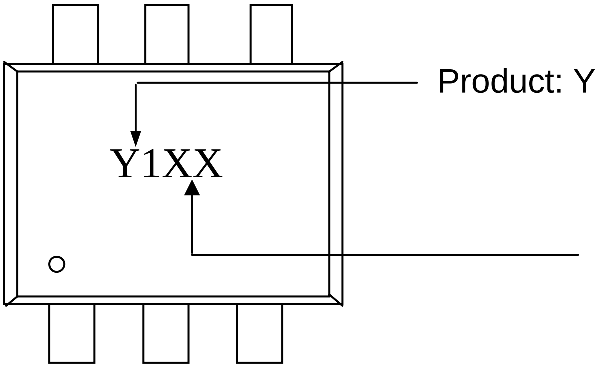


| | Millimeters | | |
|---|---|---|---|
| SYMBOLS | MIN | NOM | MAX |
| A | 2.70 | 2.90 | 3.10 |
| B | 2.60 | 2.80 | 3.00 |
| C | 1.40 | 1.60 | 1.80 |
| D | 0.30 | 0.43 | 0.55 |
| E | 0.00 | 0.05 | 0.10 |
| H | 1.20REF | | |
| G | 1.90REF | | |
| I | 0.12REF | | |
| J | 0.37REF | | |
| L | 0.95REF | | |

1. All dimensions are in millimeters.
2. Dimensions do not include mold protrusions.

## Marking Information: SOT-26

Laser Marking



Product: Y1= AP2530GY-HF-3

XX = Date/lot code
For details of how to convert this
to standard YYWW date code format,
please contact us directly.