DISCONTINUED

# ZXMN3F318DN8

## 30V SO8 Asymmetrical dual N-channel enhancement mode MOSFET

### Summary

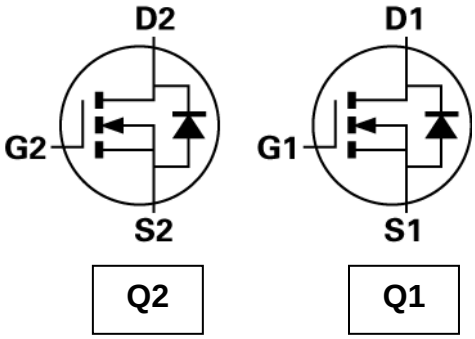
| Device | $V_{(BR)DSS}$ | $Q_G$ (nC) | $R_{DS(on)}$ (Ω) | $I_D$ (A) |
|---|---|---|---|---|
| Q1 | 30 | 12.9 | 0.024 @ $V_{GS}$= 10V | 7.3 |
| | | | 0.039 @ $V_{GS}$= 4.5V | 5.7 |
| Q2 | 30 | 9 | 0.035 @ $V_{GS}$= 10V | 6 |
| | | | 0.055 @ $V_{GS}$= 4.5V | 4.8 |

### Description

This new generation dual Trench MOSFET from Zetex features low on-resistance achievable with low (4.5V) gate drive.

### Features

- Low on-resistance
- 4.5V gate drive capability
- Low profile SOIC package

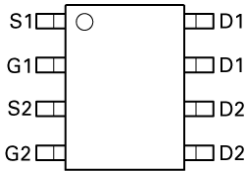



### Applications

- DC-DC Converters
- SMPS
- Load switching
- Motor control
- Backlighting

### Ordering information

| Device | Reel size (inches) | Tape width (mm) | Quantity per reel |
|---|---|---|---|
| ZXMN3F318DN8TA | 7 | 12 | 500 |




Pinout – top view

### Device marking

**ZXMN**

**3F318**

## ABSOLUTE MAXIMUM RATINGS

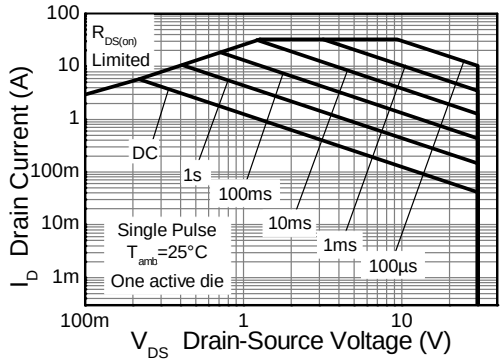
| PARAMETER | SYMBOL | LIMIT Q1 | LIMIT Q2 | UNIT |
|---|---|---|---|---|
| Drain-Source Voltage | $V_{DSS}$ | 30 | 30 | V |
| Gate-Source Voltage | $V_{GS}$ | ± 20 | ± 20 | V |
| Continuous Drain Current $V_{GS}$=10V; $T_A$=25°C (b) | $I_D$ | 7.3 | 6 | A |
| $V_{GS}$=10V; $T_A$=70°C (b) | | 5.9 | 4.8 | |
| $V_{GS}$=10V; $T_A$=25°C (a) | | 5.7 | 4.6 | |
| Pulsed Drain Current (c) | $I_{DM}$ | 33 | 25 | A |
| Continuous Source Current (Body Diode) (b) | $I_S$ | 3.5 | 3.3 | A |
| Pulsed Source Current (Body Diode) (c) | $I_{SM}$ | 33 | 25 | A |
| Power Dissipation at $T_A$ =25°C (a) (d) | $P_D$ | 1.25 | | W |
| Linear Derating Factor | | 10 | | mW/°C |
| Power Dissipation at $T_A$ =25°C (a) (e) | $P_D$ | 1.8 | | W |
| Linear Derating Factor | | 14 | | mW/°C |
| Power Dissipation at $T_A$ =25°C (b) (d) | $P_D$ | 2.1 | | W |
| Linear Derating Factor | | 17 | | mW/°C |
| Operating and Storage Temperature Range | $T_j$, $T_{stg}$ | -55 to +150 | | °C |

## THERMAL RESISTANCE

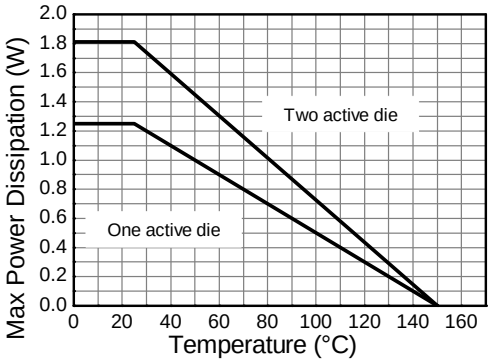
| PARAMETER | SYMBOL | VALUE | UNIT |
|---|---|---|---|
| Junction to Ambient (a) (d) | $R_{\theta JA}$ | 100 | °C/W |
| Junction to Ambient (a) (e) | $R_{\theta JA}$ | 70 | °C/W |
| Junction to Ambient (b) (d) | $R_{\theta JA}$ | 60 | °C/W |
| Junction to Lead (f) | $R_{\theta JL}$ | 53 | °C/W |

NOTES
(a) For a device surface mounted on 25mm x 25mm FR4 PCB with high coverage of single sided 1oz copper, in still air conditions.
(b) For a device surface mounted on FR4 PCB measured at t ≤ 10 sec.
(c) Repetitive rating - 25mm x 25mm FR4 PCB, D=0.02, pulse width 300us – pulse width limited by maximum junction temperature.
(d) For a dual device with one active die.
(e) For a device with two active die running at equal power.
(f) Thermal resistance from junction to solder-point (at the end of the drain lead).

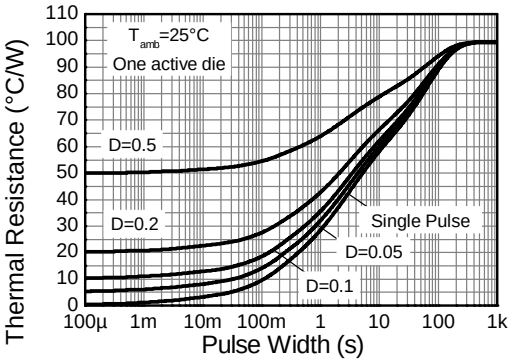
## Q1 Thermal Characteristics



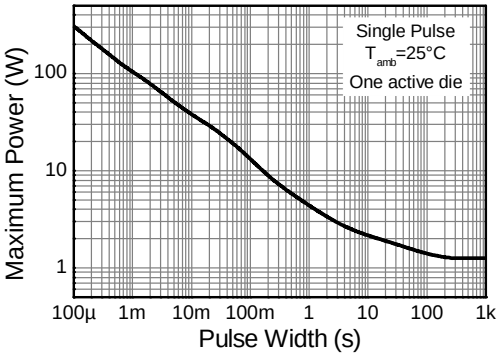

**Safe Operating Area**




**Derating Curve**




**Transient Thermal Impedance**



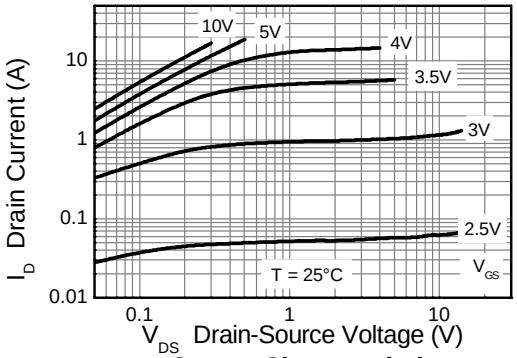

**Pulse Power Dissipation**

## Q1 ELECTRICAL CHARACTERISTICS (at $T_{amb}$ = 25°C unless otherwise stated).

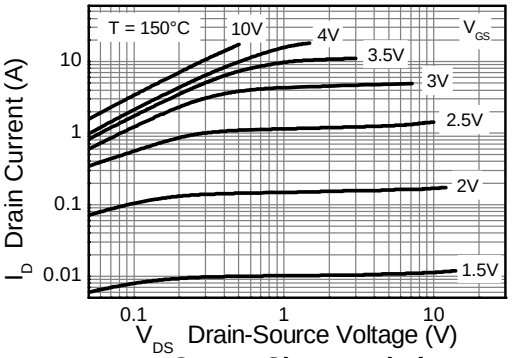
| PARAMETER | SYMBOL | MIN. | TYP. | MAX. | UNIT | CONDITIONS |
|---|---|---|---|---|---|---|
| **STATIC** | | | | | | |
| Drain-Source Breakdown Voltage | $V_{(BR)DSS}$ | 30 | | | V | $I_D$= 250μA, $V_{GS}$=0V |
| Zero Gate Voltage Drain Current | $I_{DSS}$ | | | 0.5 | μA | $V_{DS}$= 30V, $V_{GS}$=0V |
| Gate-Body Leakage | $I_{GSS}$ | | | 100 | nA | $V_{GS}$=±20V, $V_{DS}$=0V |
| Gate-Source Threshold Voltage | $V_{GS(th)}$ | 1.0 | | 3.0 | V | $I_D$= 250μA, $V_{DS}$=$V_{GS}$ |
| Static Drain-Source On-State Resistance (1) | $R_{DS(on)}$ | | | 0.024 | Ω | $V_{GS}$= 10V, $I_D$= 7.0A |
| | | | | 0.039 | Ω | $V_{GS}$= 4.5V, $I_D$ = 6.0A |
| Forward Transconductance (1) (3) | $g_{fs}$ | | 16.5 | | S | $V_{DS}$= 15V, $I_D$= 7A |
| **DYNAMIC (3)** | | | | | | |
| Input Capacitance | $C_{iss}$ | | 608 | | pF | $V_{DS}$= 15V, $V_{GS}$=0V f=1MHz |
| Output Capacitance | $C_{oss}$ | | 132 | | pF | |
| Reverse Transfer Capacitance | $C_{rss}$ | | 71 | | pF | |
| **SWITCHING (2) (3)** | | | | | | |
| Turn-On-Delay Time | $t_{d(on)}$ | | 2.9 | | ns | $V_{DD}$= 15V, $I_D$= 1A $R_G$≅6.0Ω, $V_{GS}$= 10V |
| Rise Time | $t_r$ | | 3.3 | | ns | |
| Turn-Off Delay Time | $t_{d(off)}$ | | 16 | | ns | |
| Fall Time | $t_f$ | | 8 | | ns | |
| Total Gate Charge | $Q_g$ | | 12.9 | | nC | $V_{DS}$= 15V, $V_{GS}$= 10V $I_D$= 7A |
| Gate-Source Charge | $Q_{gs}$ | | 2.5 | | nC | |
| Gate Drain Charge | $Q_{gd}$ | | 2.52 | | nC | |
| **SOURCE-DRAIN DIODE** | | | | | | |
| Diode Forward Voltage (1) | $V_{SD}$ | | 0.82 | 1.2 | V | $T_j$=25°C, $I_S$= 1.7A, $V_{GS}$=0V |
| Reverse Recovery Time (3) | $t_{rr}$ | | 12 | | ns | $T_j$=25°C, $I_S$= 2.2A, di/dt=100A/μs |
| Reverse Recovery Charge (3) | $Q_{rr}$ | | 4.8 | | nC | |

(1) Measured under pulsed conditions. Pulse width = 300μs. Duty cycle ≤ 2%.
(2) Switching characteristics are independent of operating junction temperature.
(3) For design aid only, not subject to production testing.

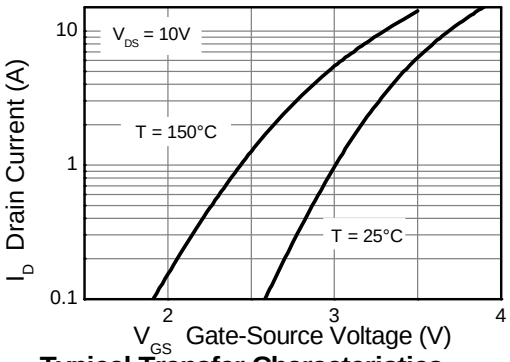
## Q1 Typical Characteristics



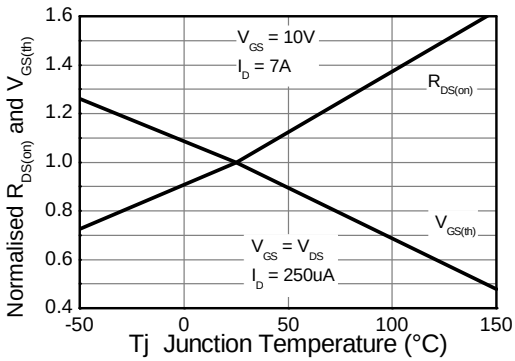

**Output Characteristics**



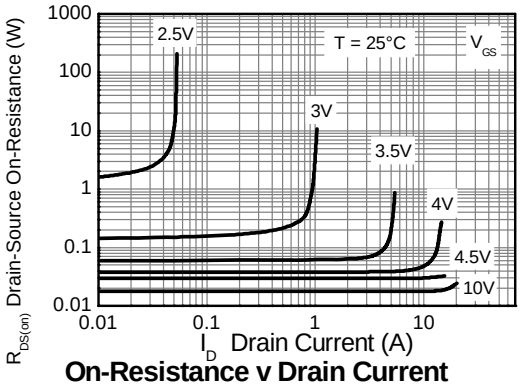

**Output Characteristics**



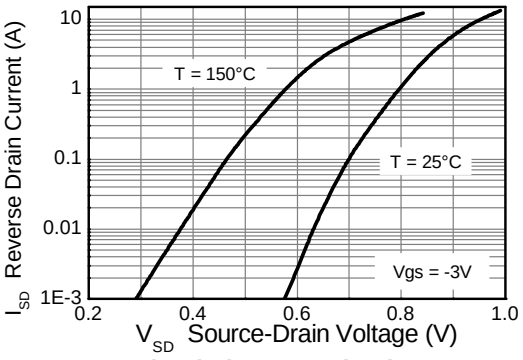

**Typical Transfer Characteristics**




**Normalised Curves v Temperature**

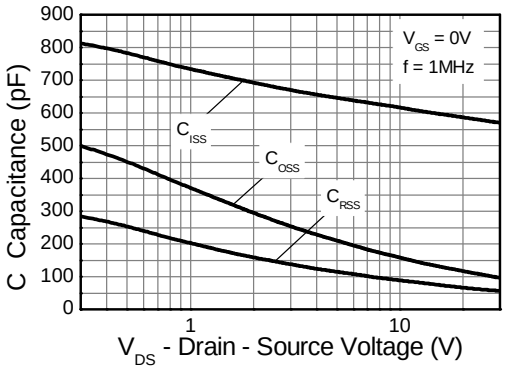



**On-Resistance v Drain Current**

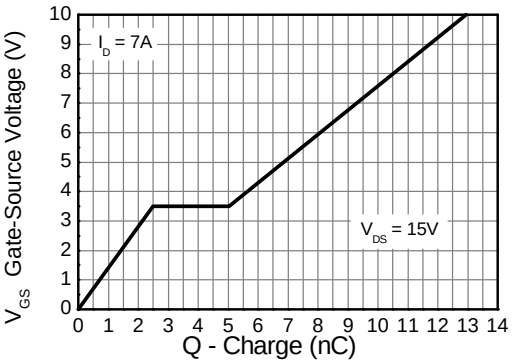



**Source-Drain Diode Forward Voltage**

## Q1 Typical Characteristics

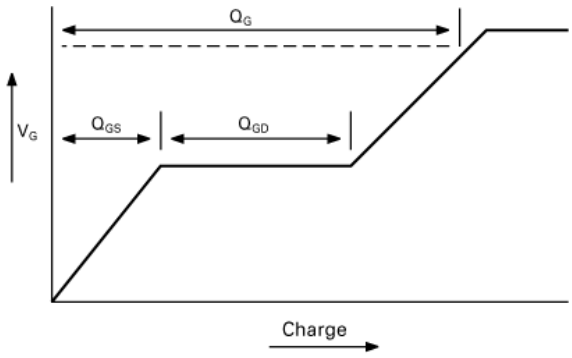



**Capacitance v Drain-Source Voltage**

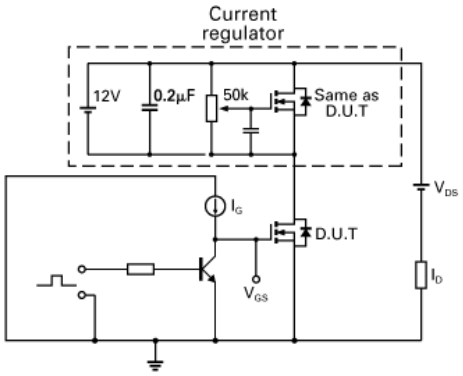



**Gate-Source Voltage v Gate Charge**

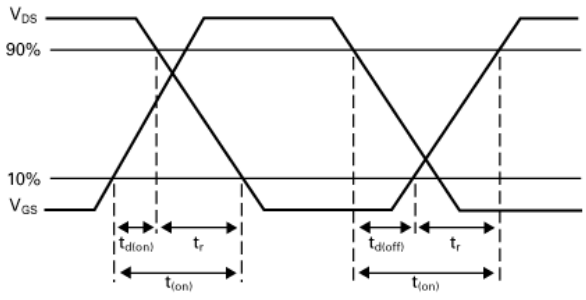
## Test Circuits



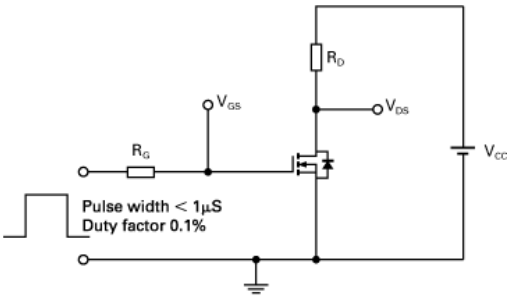

**Basic gate charge waveform**




**Gate charge test circuit**




**Switching time waveforms**



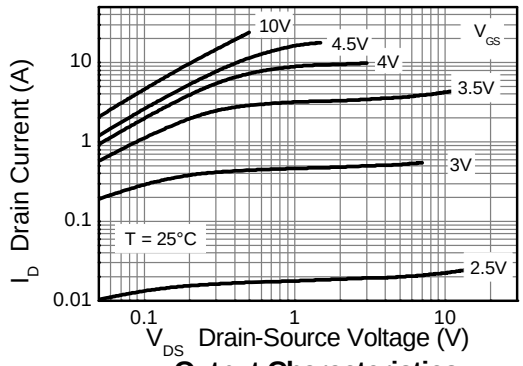

**Switching time test circuit**

## Q2 ELECTRICAL CHARACTERISTICS (at $T_{amb}$ = 25°C unless otherwise stated).

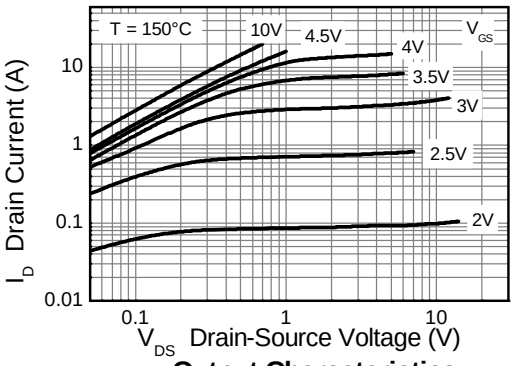
| PARAMETER | SYMBOL | MIN. | TYP. | MAX. | UNIT | CONDITIONS |
|---|---|---|---|---|---|---|
| **STATIC** | | | | | | |
| Drain-Source Breakdown Voltage | $V_{(BR)DSS}$ | 30 | | | V | $I_D$= 250μA, $V_{GS}$=0V |
| Zero Gate Voltage Drain Current | $I_{DSS}$ | | | 0.5 | μA | $V_{DS}$= 30V, $V_{GS}$=0V |
| Gate-Body Leakage | $I_{GSS}$ | | | 100 | nA | $V_{GS}$=±20V, $V_{DS}$=0V |
| Gate-Source Threshold Voltage | $V_{GS(th)}$ | 1.0 | | 3.0 | V | $I_D$= 250μA, $V_{DS}$=$V_{GS}$ |
| Static Drain-Source On-State Resistance (1) | $R_{DS(on)}$ | | | 0.035 | Ω | $V_{GS}$= 10V, $I_D$= 5.0A |
| | | | | 0.055 | Ω | $V_{GS}$= 4.5V, $I_D$ = 4A |
| Forward Transconductance (1) (3) | $g_{fs}$ | | 11.8 | | S | $V_{DS}$= 15V, $I_D$= 5A |
| **DYNAMIC (3)** | | | | | | |
| Input Capacitance | $C_{iss}$ | | 430 | | pF | $V_{DS}$= 15V, $V_{GS}$=0V f=1MHz |
| Output Capacitance | $C_{oss}$ | | 101 | | pF | |
| Reverse Transfer Capacitance | $C_{rss}$ | | 56 | | pF | |
| **SWITCHING (2) (3)** | | | | | | |
| Turn-On-Delay Time | $t_{d(on)}$ | | 2.5 | | ns | $V_{DD}$= 15V, $I_D$= 1A $R_G$≅6.0Ω, $V_{GS}$= 10V |
| Rise Time | $t_r$ | | 3.3 | | ns | |
| Turn-Off Delay Time | $t_{d(off)}$ | | 11.5 | | ns | |
| Fall Time | $t_f$ | | 6.3 | | ns | |
| Total Gate Charge | $Q_g$ | | 9 | | nC | $V_{DS}$= 15V, $V_{GS}$= 10V $I_D$= 5A |
| Gate-Source Charge | $Q_{gs}$ | | 1.7 | | nC | |
| Gate Drain Charge | $Q_{gd}$ | | 2 | | nC | |
| **SOURCE-DRAIN DIODE** | | | | | | |
| Diode Forward Voltage (1) | $V_{SD}$ | | 0.82 | 1.2 | V | $T_j$=25°C, $I_S$= 1.7A, $V_{GS}$=0V |
| Reverse Recovery Time (3) | $t_{rr}$ | | 12 | | ns | $T_j$=25°C, $I_S$= 2.1A, di/dt=100A/μs |
| Reverse Recovery Charge (3) | $Q_{rr}$ | | 4.9 | | nC | |

1 Measured under pulsed conditions. Pulse width = 300μs. Duty cycle ≤ 2%.
2 Switching characteristics are independent of operating junction temperature.
3 For design aid only, not subject to production testing.

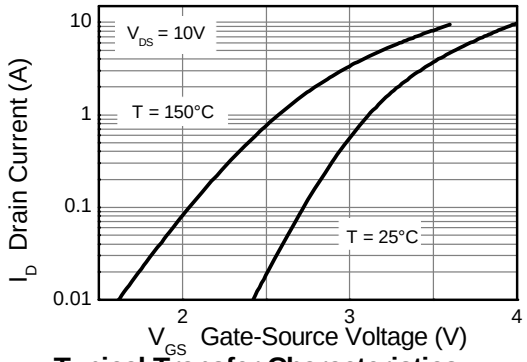
## Q2 Typical Characteristics



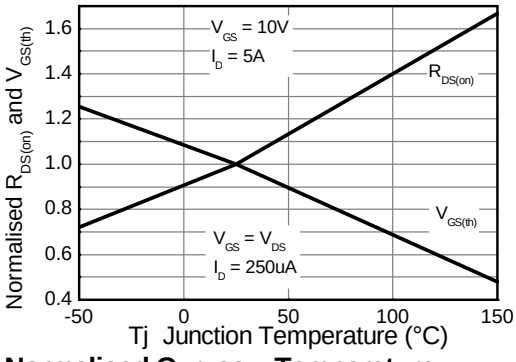

**Output Characteristics**



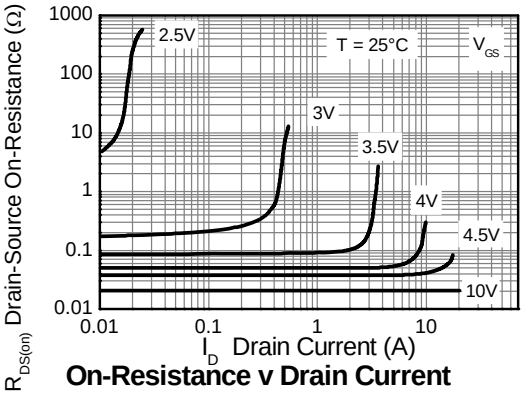

**Output Characteristics**



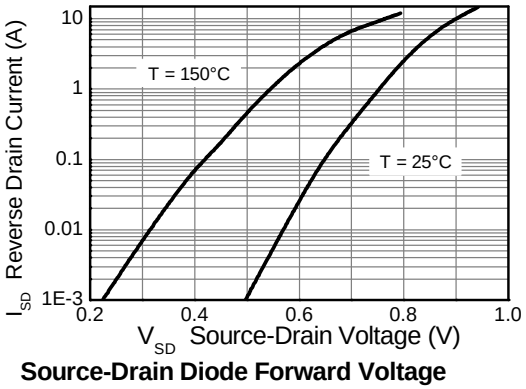

**Typical Transfer Characteristics**




**Normalised Curves v Temperature**

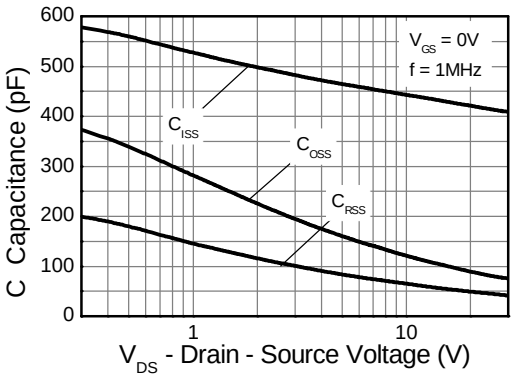



**On-Resistance v Drain Current**

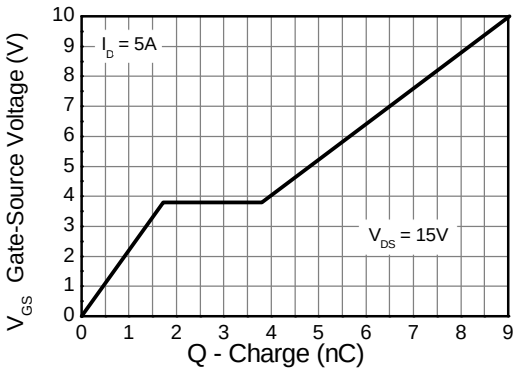



**Source-Drain Diode Forward Voltage**

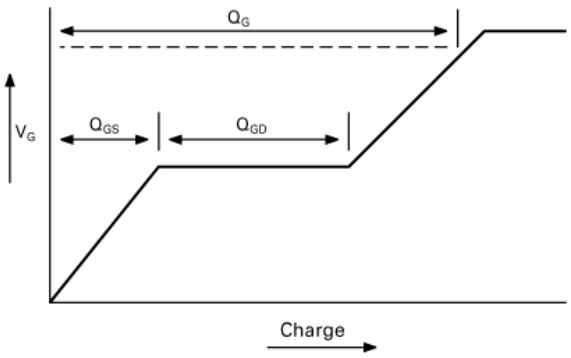
## Q2 Typical Characteristics



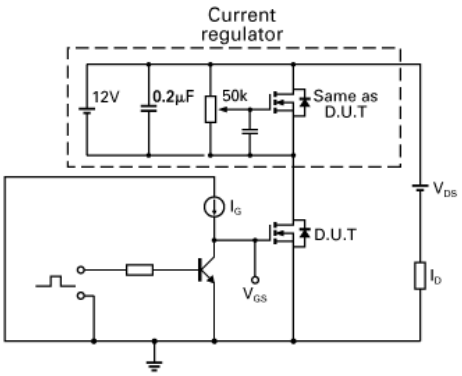

**Capacitance v Drain-Source Voltage**



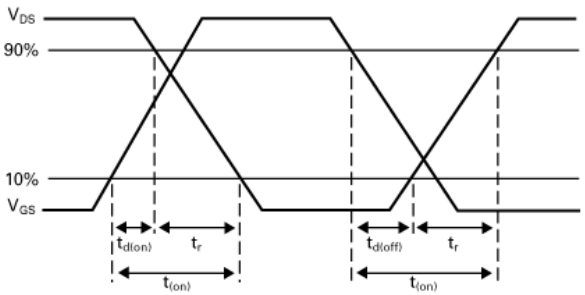

**Gate-Source Voltage v Gate Charge**



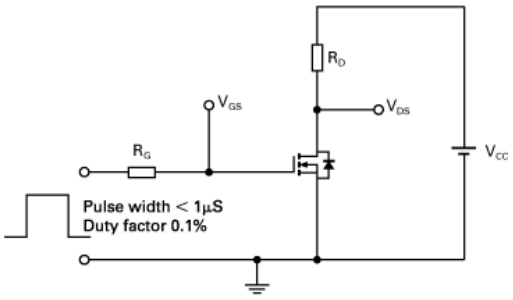

**Basic gate charge waveform**




**Gate charge test circuit**



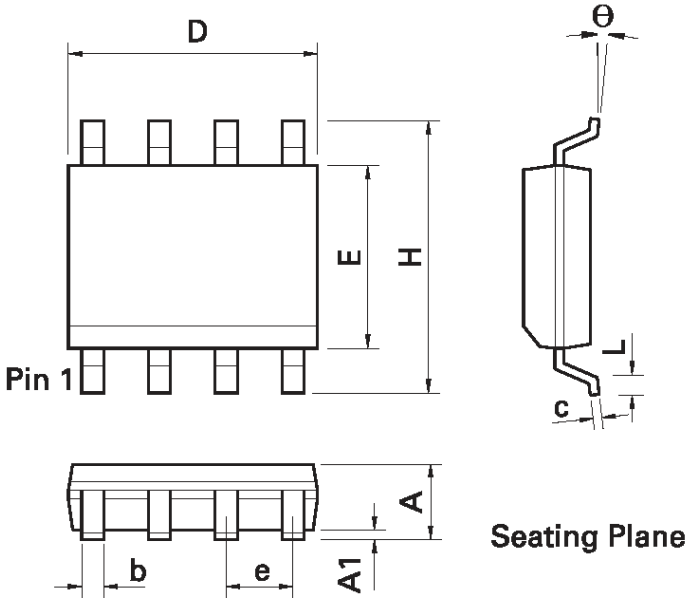

**Switching time waveforms**




**Switching time test circuit**

## Packaging details – SO8

### Package outline




| DIM | Inches | | Millimeters | | DIM | Inches | | Millimeters | |
|---|---|---|---|---|---|---|---|---|---|
| | Min. | Max. | Min. | Max. | | Min. | Max. | Min. | Max. |
| A | 0.053 | 0.069 | 1.35 | 1.75 | e | 0.050 BSC | | 1.27 BSC | |
| A1 | 0.004 | 0.010 | 0.10 | 0.25 | b | 0.013 | 0.020 | 0.33 | 0.51 |
| D | 0.189 | 0.197 | 4.80 | 5.00 | c | 0.008 | 0.010 | 0.19 | 0.25 |
| H | 0.228 | 0.244 | 5.80 | 6.20 | Θ | 0° | 8° | 0° | 8° |
| E | 0.150 | 0.157 | 3.80 | 4.00 | h | 0.010 | 0.020 | 0.25 | 0.50 |
| L | 0.016 | 0.050 | 0.40 | 1.27 | - | - | - | - | - |

**Note:** Controlling dimensions are in inches. Approximate dimensions are provided in millimeters

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A. Life support devices or systems are devices or systems which:
1. are intended to implant into the body

or

2. support or sustain life and whose failure to perform when properly used in accordance with instructions for use provided in the labeling can be reasonably expected to result in significant injury to the user.

B. A critical component is any component in a life support device or system whose failure to perform can be reasonably expected to cause the failure of the life support device or to affect its safety or effectiveness.

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Semiconductor devices are susceptible to damage by ESD. Suitable precautions should be taken when handling and transporting devices. The possible damage to devices depends on the circumstances of the handling and transporting, and the nature of the device. The extent of damage can vary from immediate functional or parametric malfunction to degradation of function or performance in use over time. Devices suspected of being affected should be replaced.

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**Product status key:**

| | |
|---|---|
| "Preview" | Future device intended for production at some point. Samples may be available |
| "Active" | Product status recommended for new designs |
| "Last time buy (LTB)" | Device will be discontinued and last time buy period and delivery is in effect |
| "Not recommended for new designs" | Device is still in production to support existing designs and production |
| "Obsolete" | Production has been discontinued |

**Datasheet status key:**

| | |
|---|---|
| "Draft version" | This term denotes a very early datasheet version and contains highly provisional information, which may change in any manner without notice. |
| "Provisional version" | This term denotes a pre-release datasheet. It provides a clear indication of anticipated performance. However, changes to the test conditions and specifications may occur, at any time and without notice. |
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