

# FS7VS-12A

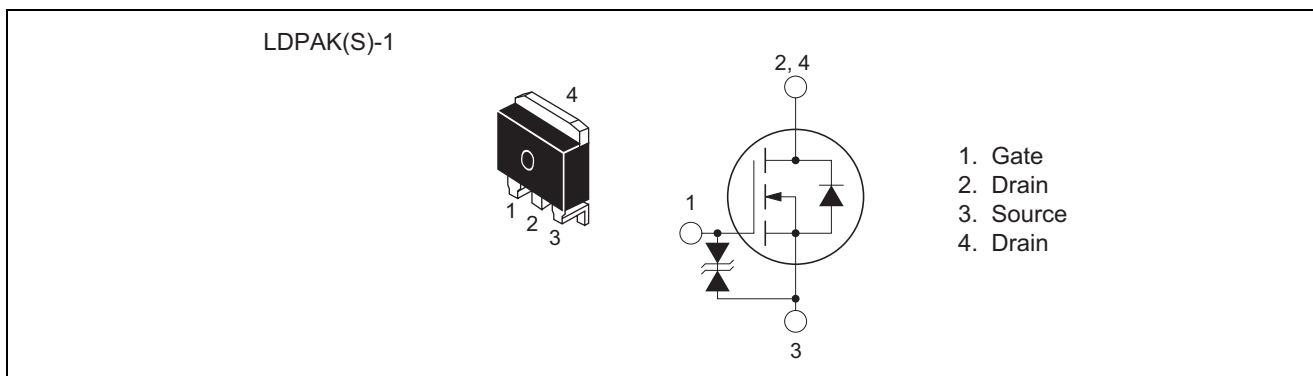
High-Speed Switching Use  
Nch Power MOS FET

REJ03G0271-0100  
Under development  
Rev.1.00  
Aug.20.2004

## Features

- Drive voltage : 10 V
- $V_{DSS}$  : 600 V
- $r_{DS(ON)(max)}$  : 1.3  $\Omega$
- $I_D$  : 7 A

## Outline



## Applications

SMPS, lamp ballast, etc.

## Maximum Ratings

( $T_c = 25^\circ\text{C}$ )

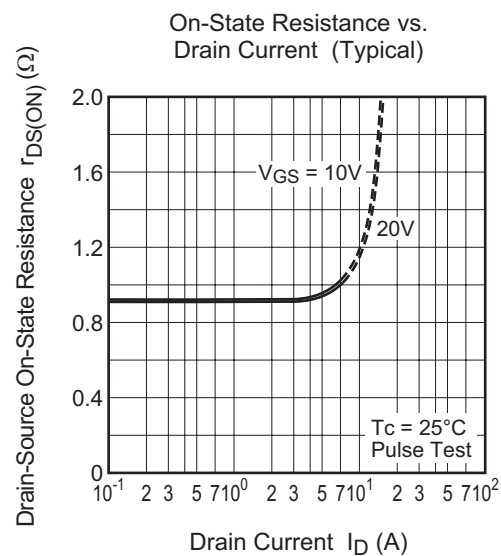
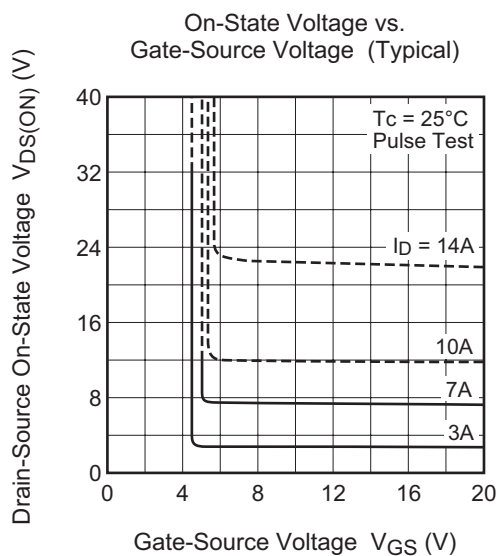
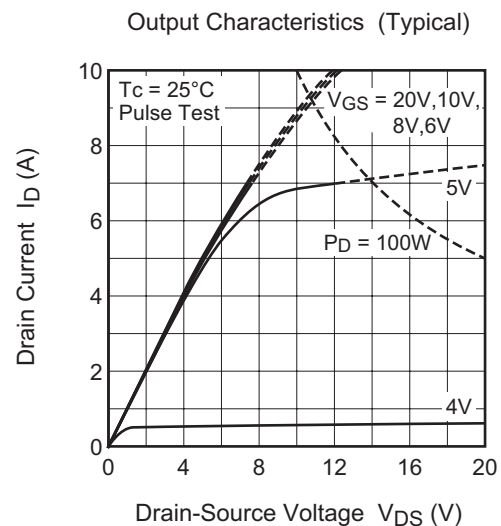
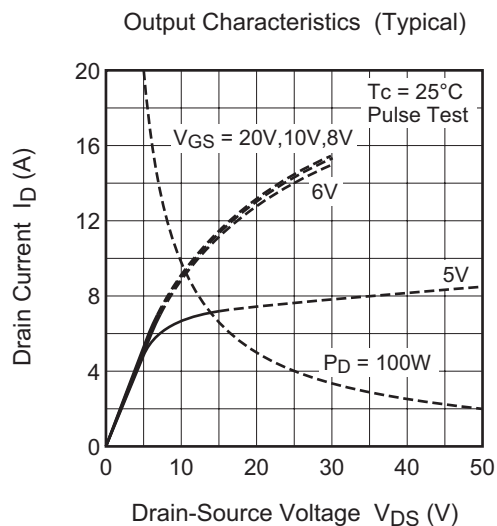
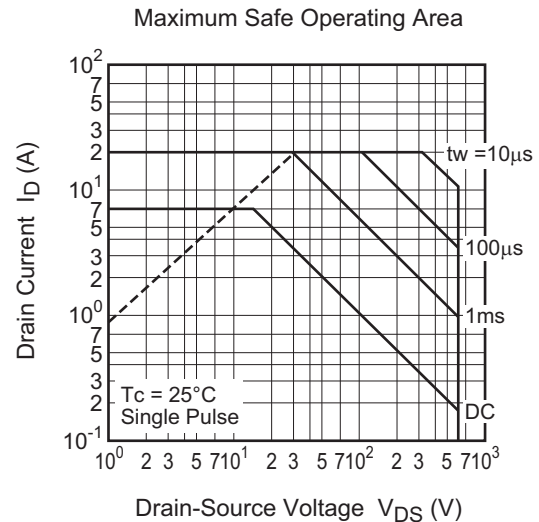
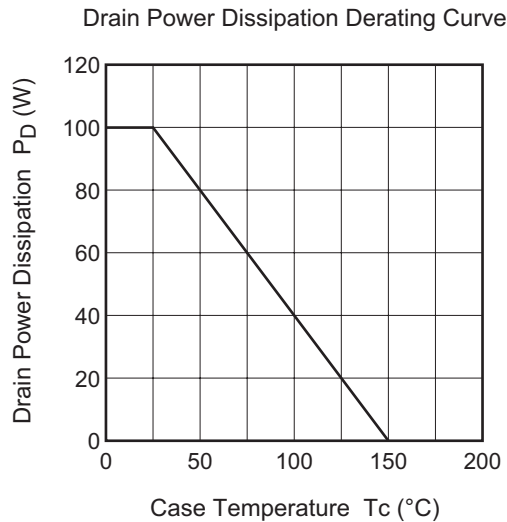
| Parameter                  | Symbol    | Ratings         | Unit             | Conditions                   |
|----------------------------|-----------|-----------------|------------------|------------------------------|
| Drain-source voltage       | $V_{DSS}$ | 600             | V                | $V_{GS} = 0\text{ V}$        |
| Gate-source voltage        | $V_{GSS}$ | $\pm 30$        | V                | $V_{DS} = 0\text{ V}$        |
| Drain current              | $I_D$     | 7               | A                |                              |
| Drain current (Pulsed)     | $I_{DM}$  | 21              | A                |                              |
| Avalanche current (Pulsed) | $I_{DA}$  | 7               | A                | $L = 200\text{ }\mu\text{H}$ |
| Maximum power dissipation  | $P_D$     | 100             | W                |                              |
| Channel temperature        | $T_{ch}$  | $-55$ to $+150$ | $^\circ\text{C}$ |                              |
| Storage temperature        | $T_{stg}$ | $-55$ to $+150$ | $^\circ\text{C}$ |                              |
| Mass                       | —         | 1.2             | g                | Typical value                |

## Electrical Characteristics

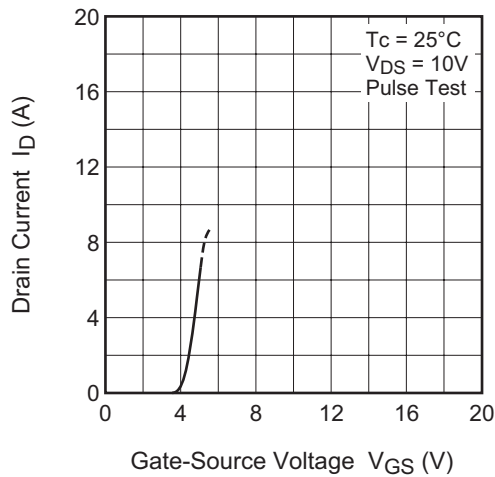
(Tch = 25°C)

| Parameter                        | Symbol         | Min.     | Typ. | Max.     | Unit                 | Test conditions                                                                                                         |
|----------------------------------|----------------|----------|------|----------|----------------------|-------------------------------------------------------------------------------------------------------------------------|
| Drain-source breakdown voltage   | $V_{(BR)DSS}$  | 600      | —    | —        | V                    | $I_D = 1 \text{ mA}$ , $V_{GS} = 0 \text{ V}$                                                                           |
| Gate-source breakdown voltage    | $V_{(BR)GSS}$  | $\pm 30$ | —    | —        | V                    | $I_G = \pm 100 \text{ }\mu\text{A}$ , $V_{DS} = 0 \text{ V}$                                                            |
| Gate-source leakage current      | $I_{GSS}$      | —        | —    | $\pm 10$ | $\mu\text{A}$        | $V_{GS} = \pm 25 \text{ V}$ , $V_{DS} = 0 \text{ V}$                                                                    |
| Drain-source leakage current     | $I_{DSS}$      | —        | —    | 1        | mA                   | $V_{DS} = 600 \text{ V}$ , $V_{GS} = 0 \text{ V}$                                                                       |
| Gate-source threshold voltage    | $V_{GS(th)}$   | 2.5      | 3.0  | 3.5      | V                    | $I_D = 1 \text{ mA}$ , $V_{DS} = 10 \text{ V}$                                                                          |
| Drain-source on-state resistance | $r_{DS(on)}$   | —        | 1.0  | 1.3      | $\Omega$             | $I_D = 3 \text{ A}$ , $V_{GS} = 10 \text{ V}$                                                                           |
| Drain-source on-state voltage    | $V_{DS(on)}$   | —        | 3.0  | 3.9      | V                    | $I_D = 3 \text{ A}$ , $V_{GS} = 10 \text{ V}$                                                                           |
| Forward transfer admittance      | $ y_{fs} $     | 4.2      | 7.0  | —        | S                    | $I_D = 3 \text{ A}$ , $V_{DS} = 10 \text{ V}$                                                                           |
| Input capacitance                | $C_{iss}$      | —        | 1100 | —        | pF                   | $V_{DS} = 25 \text{ V}$ , $V_{GS} = 10 \text{ V}$ ,<br>$f = 1 \text{ MHz}$                                              |
| Output capacitance               | $C_{oss}$      | —        | 100  | —        | pF                   |                                                                                                                         |
| Reverse transfer capacitance     | $C_{rss}$      | —        | 25   | —        | pF                   |                                                                                                                         |
| Turn-on delay time               | $t_{d(on)}$    | —        | 20   | —        | ns                   | $V_{DD} = 200 \text{ V}$ , $I_D = 3 \text{ A}$ ,<br>$V_{GS} = 10 \text{ V}$ ,<br>$R_{GEN} = R_{GS} = 50 \text{ }\Omega$ |
| Rise time                        | $t_r$          | —        | 25   | —        | ns                   |                                                                                                                         |
| Turn-off delay time              | $t_{d(off)}$   | —        | 150  | —        | ns                   |                                                                                                                         |
| Fall time                        | $t_f$          | —        | 35   | —        | ns                   |                                                                                                                         |
| Source-drain voltage             | $V_{SD}$       | —        | 1.5  | 2.0      | V                    | $I_S = 3 \text{ A}$ , $V_{GS} = 0 \text{ V}$                                                                            |
| Thermal resistance               | $R_{th(ch-c)}$ | —        | —    | 1.25     | $^{\circ}\text{C/W}$ | Channel to case                                                                                                         |

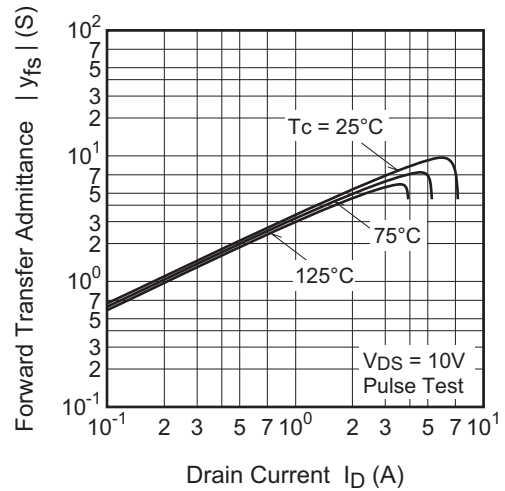
## Performance Curves



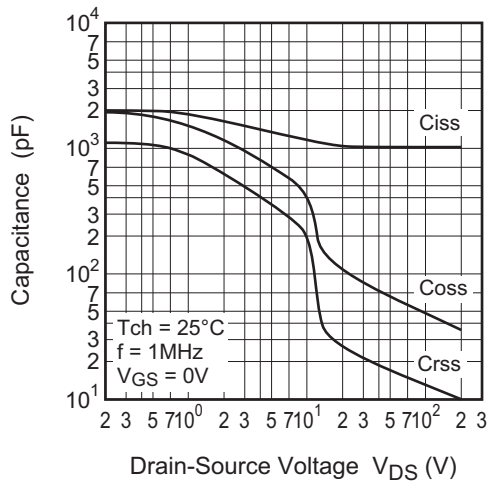
Transfer Characteristics (Typical)



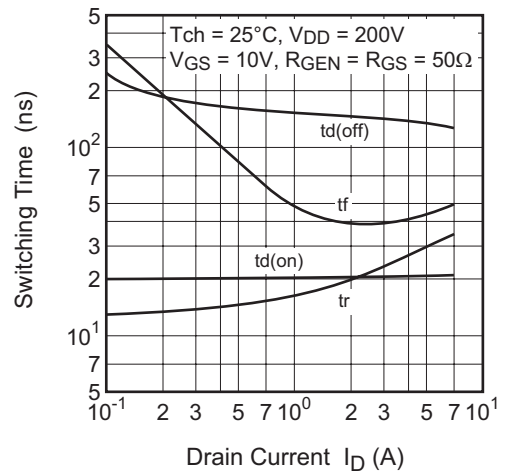
Forward Transfer Admittance vs. Drain Current (Typical)



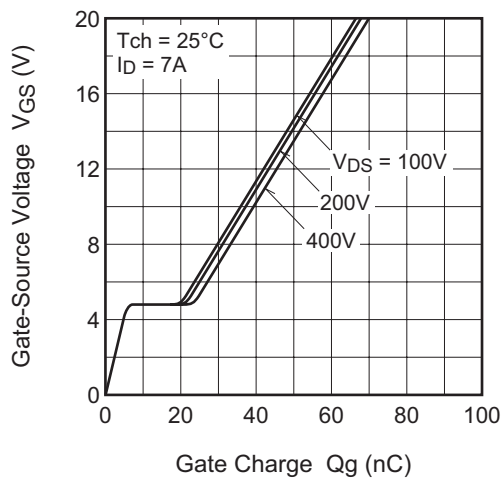
Capacitance vs. Drain-Source Voltage (Typical)



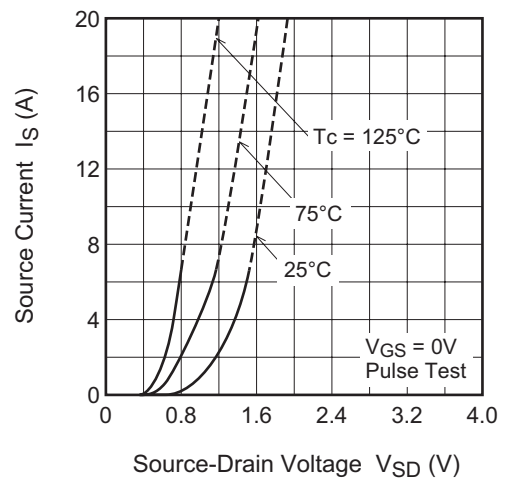
Switching Characteristics (Typical)

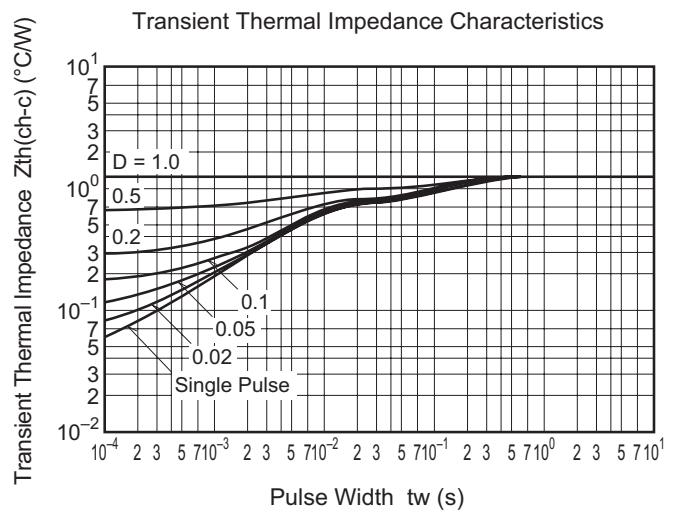
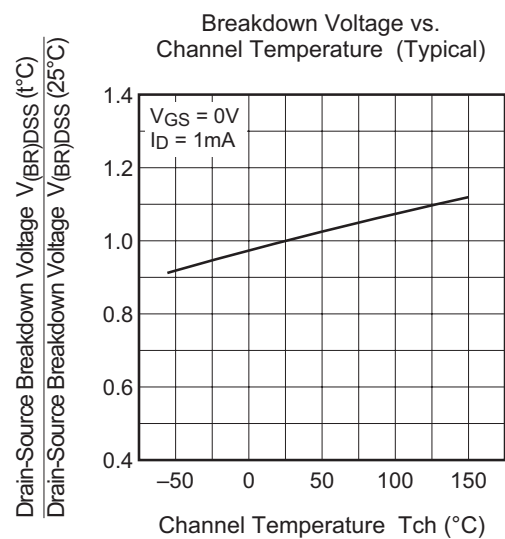
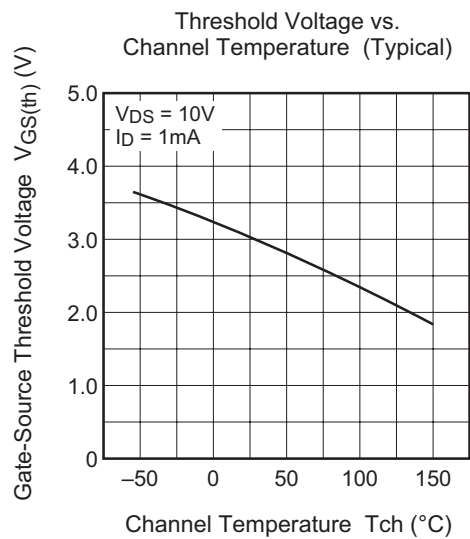
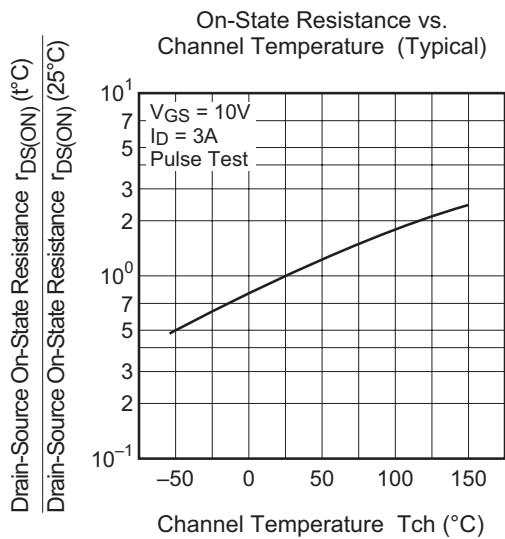


Gate-Source Voltage vs. Gate Charge (Typical)

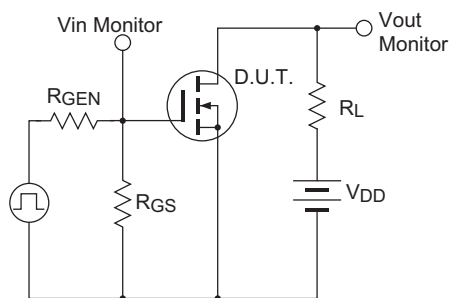


Source-Drain Diode Forward Characteristics (Typical)

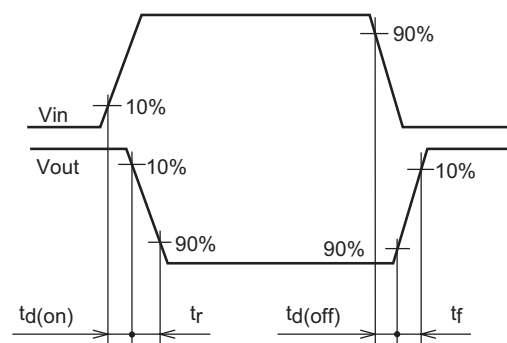




Switching Time Measurement Circuit



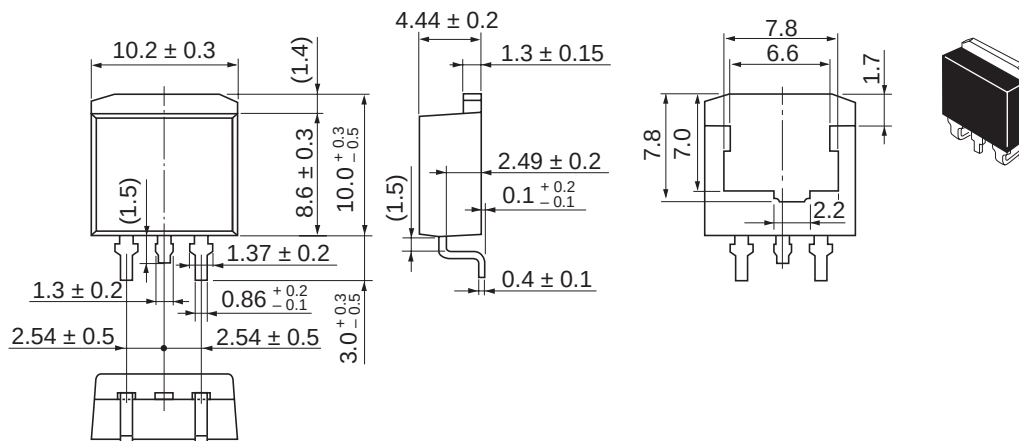
Switching Waveform



## Package Dimensions

As of January, 2003

Unit: mm



|                        |               |
|------------------------|---------------|
| Package Code           | LDPAK (S)-(1) |
| JEDEC                  | —             |
| JEITA                  | —             |
| Mass (reference value) | 1.30 g        |

## Order Code

| Lead form            | Standard packing | Quantity | Standard order code                  | Standard order code example |
|----------------------|------------------|----------|--------------------------------------|-----------------------------|
| Surface-mounted type | Taping           | 1000     | Type name – T +Direction (1 or 2) +1 | FS7VS-12A-T11               |

Note : Please confirm the specification about the shipping in detail.

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