

# 2SK1157, 2SK1158

Silicon N Channel MOS FET

REJ03G0910-0200  
(Previous: ADE-208-1248)  
Rev.2.00  
Sep 07, 2005

## Application

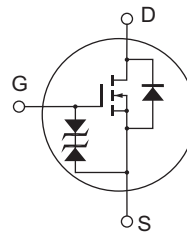
High speed power switching

## Features

- Low on-resistance
- High speed switching
- Low drive current
- No secondary breakdown
- Suitable for switching regulator, DC-DC converter and motor driver

## Outline

RENESAS Package code: PRSS0004AC-A  
(Package name: TO-220AB)



1. Gate
2. Drain  
(Flange)
3. Source

## Absolute Maximum Ratings

(Ta = 25°C)

| Item                                      |         | Symbol              | Ratings     | Unit |
|-------------------------------------------|---------|---------------------|-------------|------|
| Drain to source voltage                   | 2SK1157 | $V_{DSS}$           | 450         | V    |
|                                           | 2SK1158 |                     | 500         |      |
| Gate to source voltage                    |         | $V_{GSS}$           | $\pm 30$    | V    |
| Drain current                             |         | $I_D$               | 7           | A    |
| Drain peak current                        |         | $I_{D(pulse)}^{*1}$ | 28          | A    |
| Body to drain diode reverse drain current |         | $I_{DR}$            | 7           | A    |
| Channel dissipation                       |         | $P_{ch}^{*2}$       | 60          | W    |
| Channel temperature                       |         | Tch                 | 150         | °C   |
| Storage temperature                       |         | Tstg                | -55 to +150 | °C   |

Notes: 1.  $PW \leq 10 \mu s$ , duty cycle  $\leq 1\%$ 2. Value at  $T_C = 25^\circ C$ 

## Electrical Characteristics

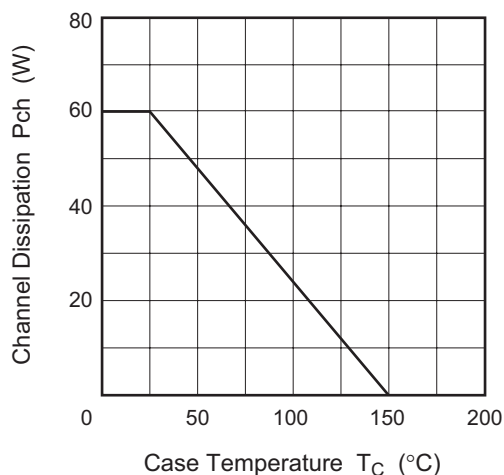
(Ta = 25°C)

| Item                                       |         | Symbol        | Min      | Typ  | Max      | Unit     | Test conditions                                                         |
|--------------------------------------------|---------|---------------|----------|------|----------|----------|-------------------------------------------------------------------------|
| Drain to source breakdown voltage          | 2SK1157 | $V_{(BR)DSS}$ | 450      | —    | —        | V        | $I_D = 10 \text{ mA}$ , $V_{GS} = 0$                                    |
|                                            | 2SK1158 |               | 500      |      |          |          |                                                                         |
| Gate to source breakdown voltage           |         | $V_{(BR)GSS}$ | $\pm 30$ | —    | —        | V        | $I_G = \pm 100 \mu A$ , $V_{DS} = 0$                                    |
| Gate to source leak current                |         | $I_{GSS}$     | —        | —    | $\pm 10$ | $\mu A$  | $V_{GS} = \pm 25 \text{ V}$ , $V_{DS} = 0$                              |
| Zero gate voltage drain current            | 2SK1157 | $I_{DSS}$     | —        | —    | 250      | $\mu A$  | $V_{DS} = 360 \text{ V}$ , $V_{GS} = 0$                                 |
|                                            | 2SK1158 |               |          |      |          |          | $V_{DS} = 400 \text{ V}$ , $V_{GS} = 0$                                 |
| Gate to source cutoff voltage              |         | $V_{GS(off)}$ | 2.0      | —    | 3.0      | V        | $I_D = 1 \text{ mA}$ , $V_{DS} = 10 \text{ V}$                          |
| Static drain to source on state resistance | 2SK1157 | $R_{DS(on)}$  | —        | 0.6  | 0.8      | $\Omega$ | $I_D = 4 \text{ A}$ , $V_{GS} = 10 \text{ V}^{*3}$                      |
|                                            | 2SK1158 |               | —        | 0.7  | 0.9      |          |                                                                         |
| Forward transfer admittance                |         | $ y_{fs} $    | 4.0      | 6.5  | —        | S        | $I_D = 4 \text{ A}$ , $V_{DS} = 10 \text{ V}^{*3}$                      |
| Input capacitance                          |         | $C_{iss}$     | —        | 1050 | —        | pF       | $V_{DS} = 10 \text{ V}$ , $V_{GS} = 0$ ,<br>$f = 1 \text{ MHz}$         |
| Output capacitance                         |         | $C_{oss}$     | —        | 280  | —        | pF       |                                                                         |
| Reverse transfer capacitance               |         | $C_{rss}$     | —        | 40   | —        | pF       |                                                                         |
| Turn-on delay time                         |         | $t_{d(on)}$   | —        | 15   | —        | ns       | $I_D = 4 \text{ A}$ , $V_{GS} = 10 \text{ V}$ ,<br>$R_L = 7.5 \Omega$   |
| Rise time                                  |         | $t_r$         | —        | 55   | —        | ns       |                                                                         |
| Turn-off delay time                        |         | $t_{d(off)}$  | —        | 95   | —        | ns       |                                                                         |
| Fall time                                  |         | $t_f$         | —        | 40   | —        | ns       |                                                                         |
| Body to drain diode forward voltage        |         | $V_{DF}$      | —        | 0.95 | —        | V        | $I_F = 7 \text{ A}$ , $V_{GS} = 0$                                      |
| Body to drain diode reverse recovery time  |         | $t_{rr}$      | —        | 320  | —        | ns       | $I_F = 7 \text{ A}$ , $V_{GS} = 0$ ,<br>$di_F/dt = 100 \text{ A}/\mu s$ |

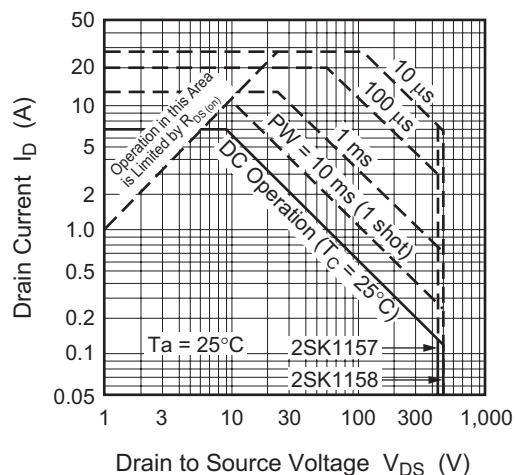
Note: 3. Pulse test

## Main Characteristics

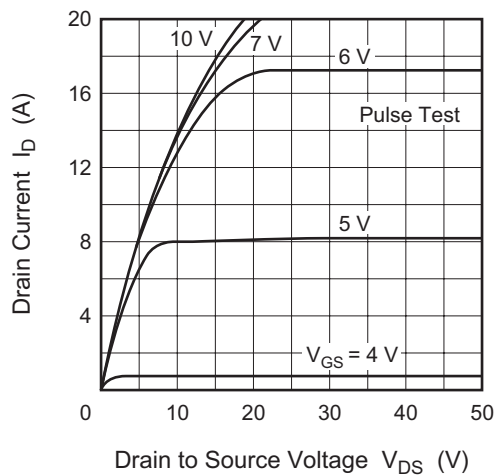
Power vs. Temperature Derating



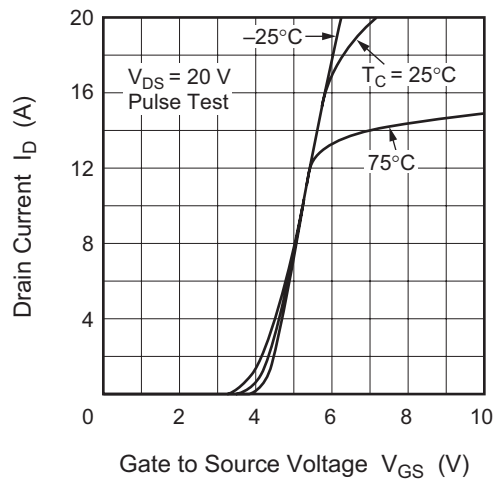
Maximum Safe Operation Area



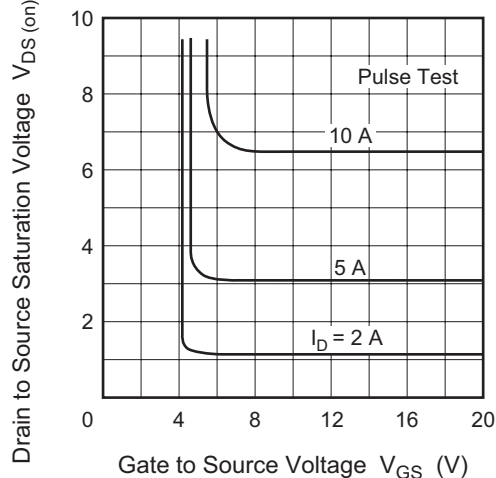
Typical Output Characteristics



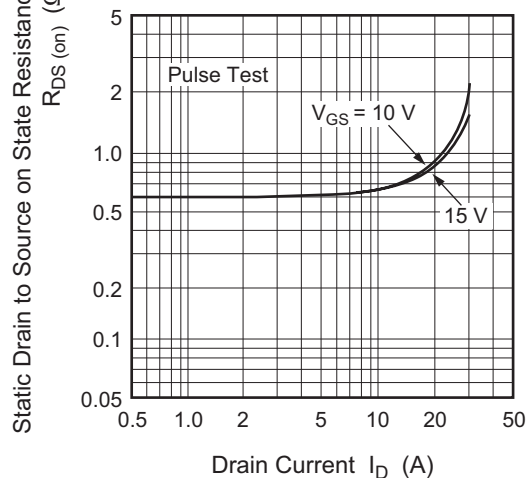
Typical Transfer Characteristics

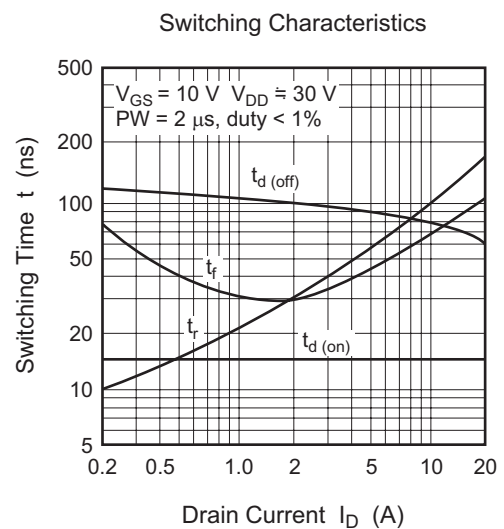
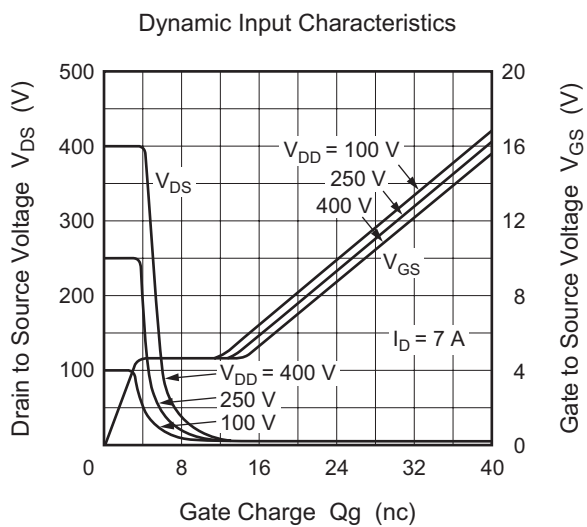
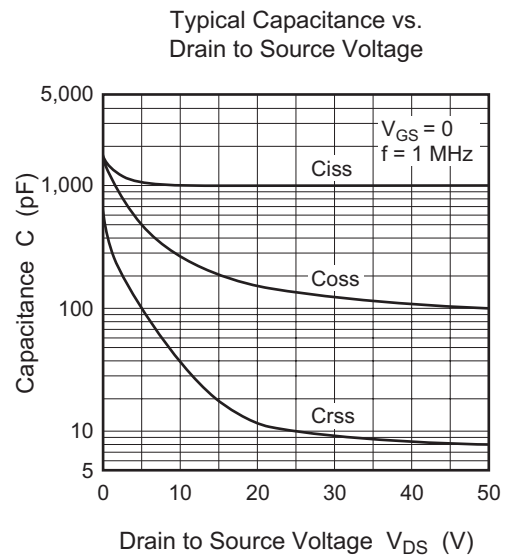
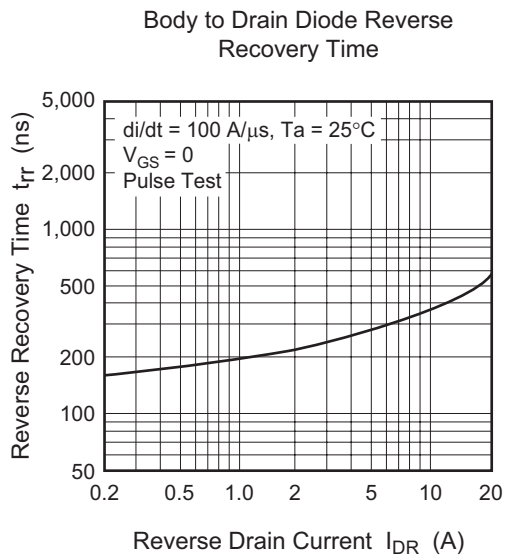
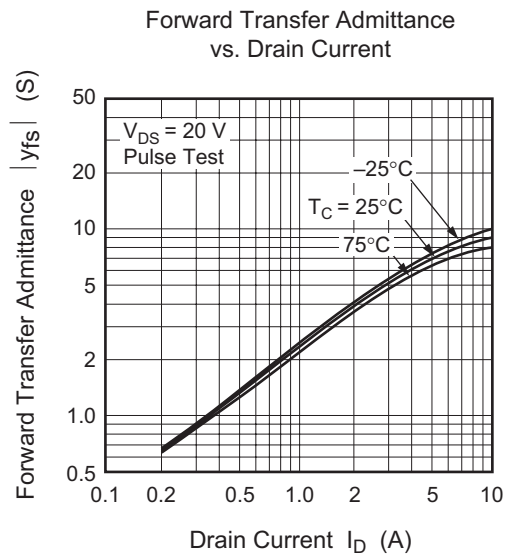
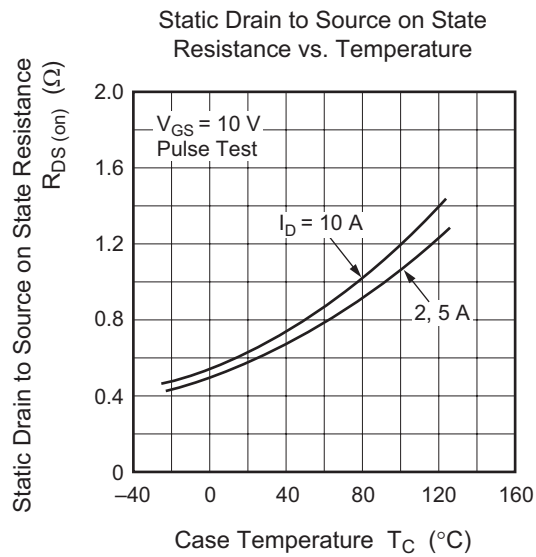


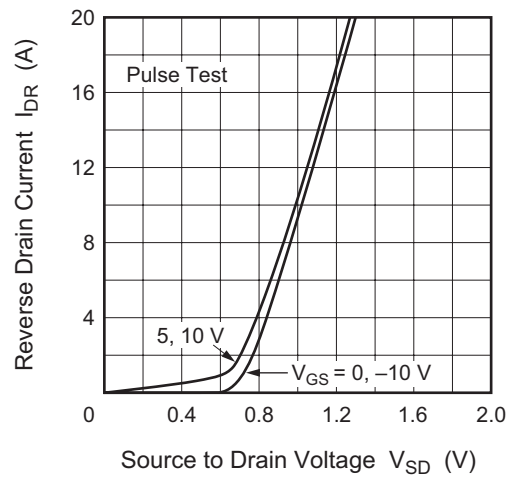
Drain to Source Saturation Voltage vs. Gate to Source Voltage



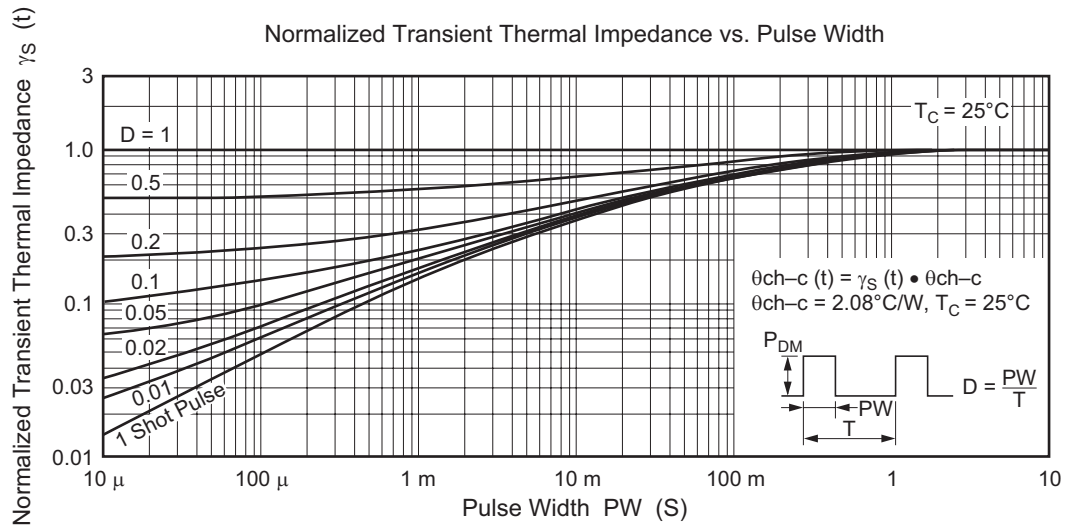
Static Drain to Source on State Resistance vs. Drain Current



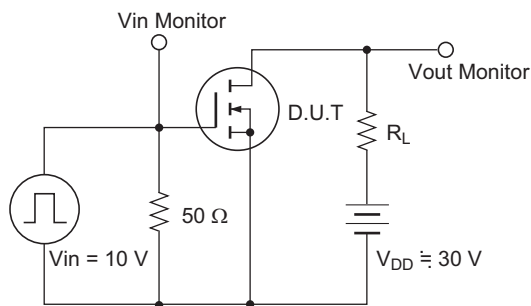


Reverse Drain Current vs.  
Source to Drain Voltage

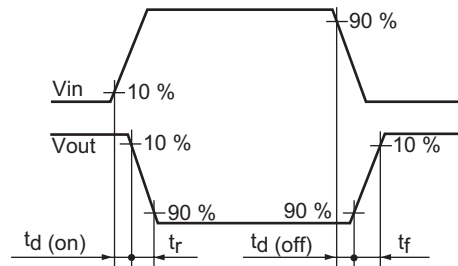
Normalized Transient Thermal Impedance vs. Pulse Width



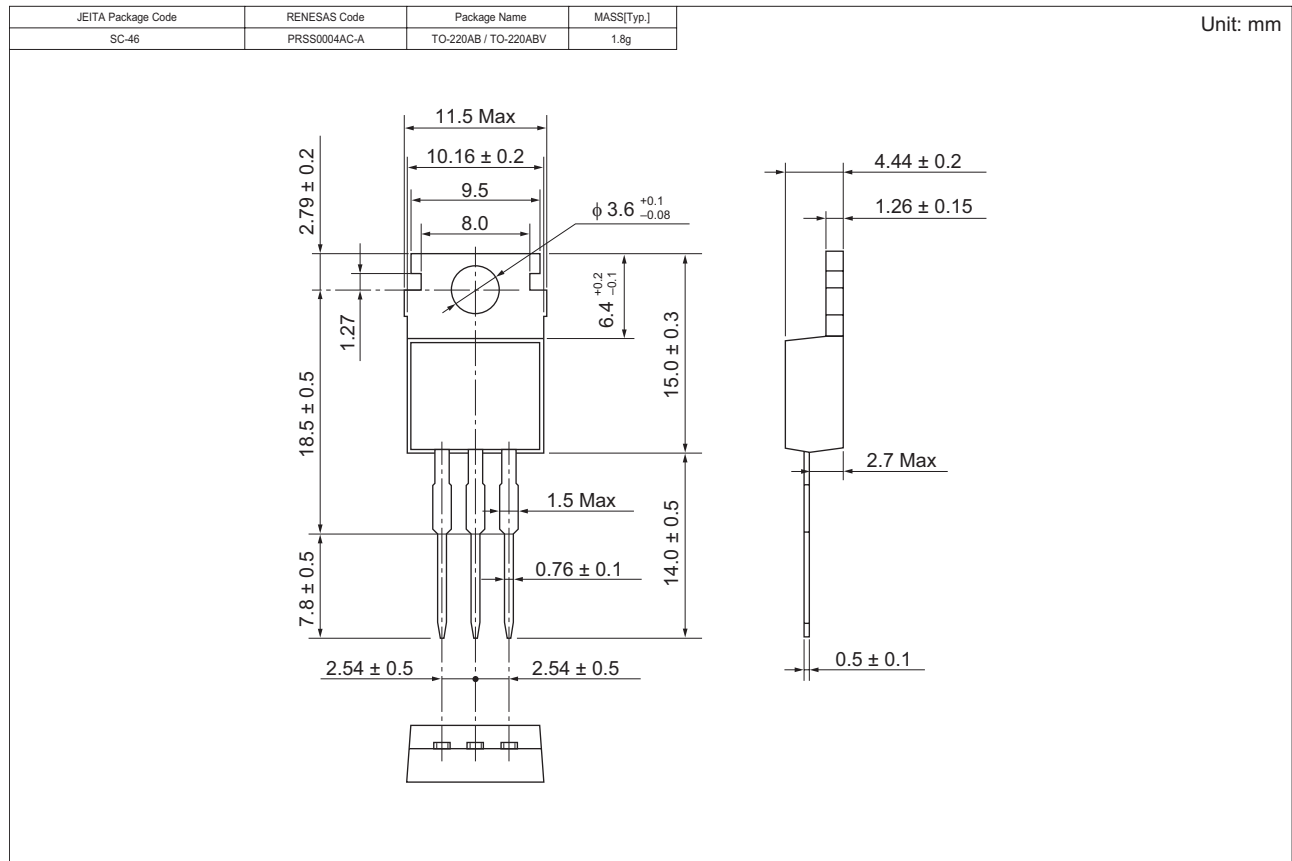
Switching Time Test Circuit



Waveforms



## Package Dimensions



## Ordering Information

| Part Name | Quantity | Shipping Container |
|-----------|----------|--------------------|
| 2SK1157-E | 500 pcs  | Box (Sack)         |
| 2SK1158-E | 500 pcs  | Box (Sack)         |

Note: For some grades, production may be terminated. Please contact the Renesas sales office to check the state of production before ordering the product.

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