Ordering number : ENN8023

SANYO Semiconductors
DATA SHEET

N-Channel Silicon MOSFET

# 2SK3709 — General-Purpose Switching Device Applications

## Features

- Low ON-resistance.
- 4V drive.
- Motor driver, DC / DC converter.
- Avalanche resistance guarantee.

## Specifications

### Absolute Maximum Ratings at Ta=25°C

| Parameter | Symbol | Conditions | Ratings | Unit |
|---|---|---|---|---|
| Drain-to-Source Voltage | $V_{DSS}$ | | 100 | V |
| Gate-to-Source Voltage | $V_{GSS}$ | | ±20 | V |
| Drain Current (DC) | $I_D$ | | 37 | A |
| Drain Current (Pulse) | $I_{DP}$ | PW≤10μs, duty cycle≤1% | 148 | A |
| Allowable Power Dissipation | $P_D$ | | 2.0 | W |
| | | Tc=25°C | 35 | W |
| Channel Temperature | Tch | | 150 | °C |
| Storage Temperature | Tstg | | –55 to +150 | °C |
| Avalanche Energy (Single Pulse) *1 | $E_{AS}$ | | 427 | mJ |
| Avalanche Current *2 | $I_{AV}$ | | 37 | A |

*1 $V_{DD}$=20V, L=500μH, $I_{AV}$=37A

*2 L≤500μH, single pulse

### Electrical Characteristics at Ta=25°C

| Parameter | Symbol | Conditions | Ratings | | | Unit |
|---|---|---|---|---|---|---|
| | | | min | typ | max | |
| Drain-to-Source Breakdown Voltage | $V_{(BR)DSS}$ | $I_D$=1mA, $V_{GS}$=0 | 100 | | | V |
| Zero-Gate Voltage Drain Current | $I_{DSS}$ | $V_{DS}$=100V, $V_{GS}$=0 | | | 1 | μA |
| Gate-to-Source Leakage Current | $I_{GSS}$ | $V_{GS}$= ±16V, $V_{DS}$=0 | | | ±10 | μA |
| Cutoff Voltage | $V_{GS}(off)$ | $V_{DS}$=10V, $I_D$=1mA | 1.2 | | 2.6 | V |
| Forward Transfer Admittance | $\|yfs\|$ | $V_{DS}$=10V, $I_D$=19A | 25 | 36 | | S |
| Static Drain-to-Source On-State Resistance | $R_{DS}(on)1$ | $I_D$=19A, $V_{GS}$=10V | | 19 | 25 | mΩ |
| | $R_{DS}(on)2$ | $I_D$=19A, $V_{GS}$=4V | | 23 | 32 | mΩ |

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Continued from preceding page.

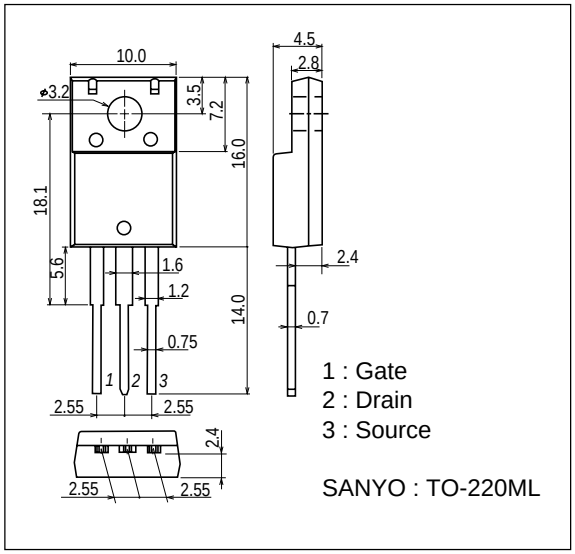
| Parameter | Symbol | Conditions | Ratings | | | Unit |
|---|---|---|---|---|---|---|
| | | | min | typ | max | |
| Input Capacitance | Ciss | $V_{DS}$=20V, f=1MHz | | 6250 | | pF |
| Output Capacitance | Coss | $V_{DS}$=20V, f=1MHz | | 440 | | pF |
| Reverse Transfer Capacitance | Crss | $V_{DS}$=20V, f=1MHz | | 380 | | pF |
| Turn-ON Delay Time | $t_{d}$(on) | See specified Test Circuit. | | 45 | | ns |
| Rise Time | $t_{r}$ | See specified Test Circuit. | | 115 | | ns |
| Turn-OFF Delay Time | $t_{d}$(off) | See specified Test Circuit. | | 500 | | ns |
| Fall Time | $t_{f}$ | See specified Test Circuit. | | 180 | | ns |
| Total Gate Charge | Qg | $V_{DS}$=50V, $V_{GS}$=10V, $I_{D}$=37A | | 117 | | nC |
| Gate-to-Source Charge | Qgs | $V_{DS}$=50V, $V_{GS}$=10V, $I_{D}$=37A | | 20 | | nC |
| Gate-to-Drain “Miller” Charge | Qgd | $V_{DS}$=50V, $V_{GS}$=10V, $I_{D}$=37A | | 25.8 | | nC |
| Diode Forward Voltage | $V_{SD}$ | $I_{S}$=37A, $V_{GS}$=0 | | 0.97 | 1.2 | V |

Marking : K3709

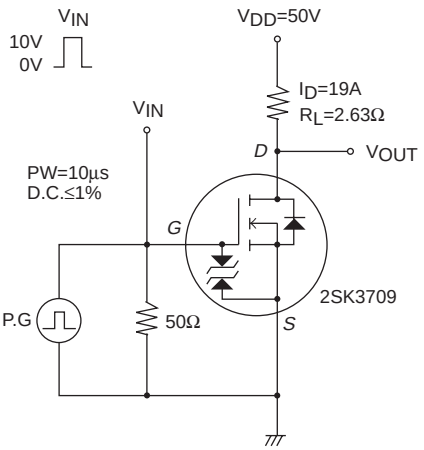
## Package Dimensions

unit : mm

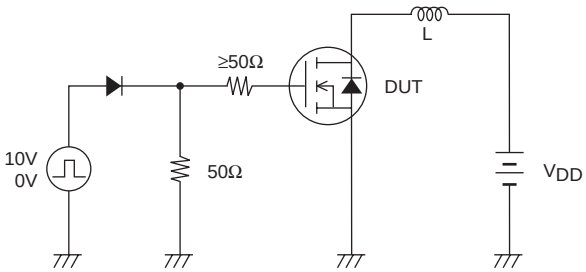
2063A

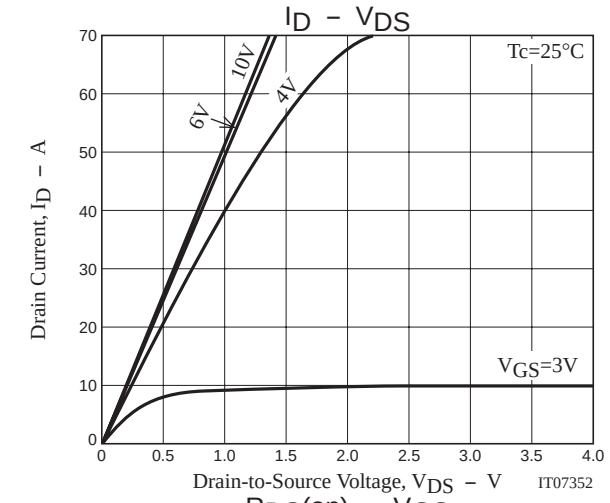


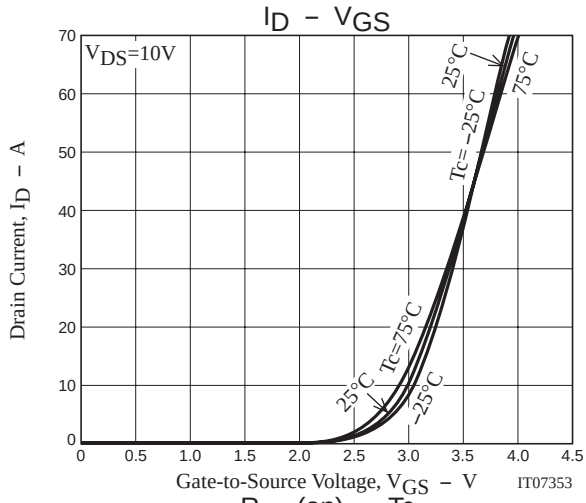

## Switching Time Test Circuit

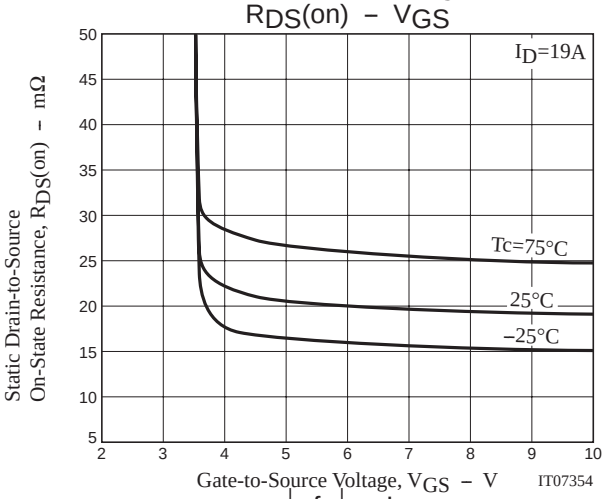


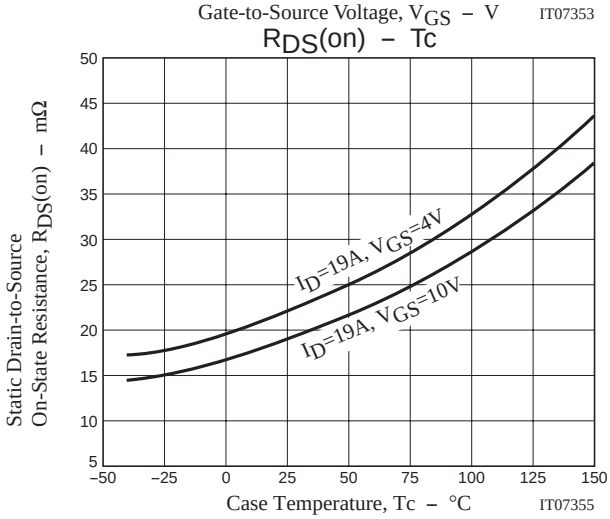

## Unclamped Inductive Test Circuit

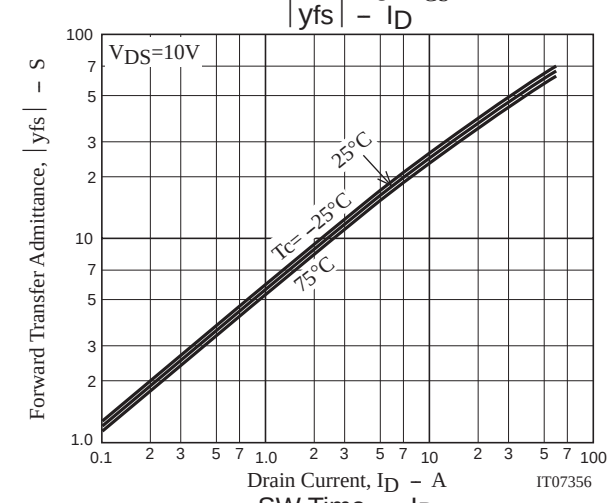


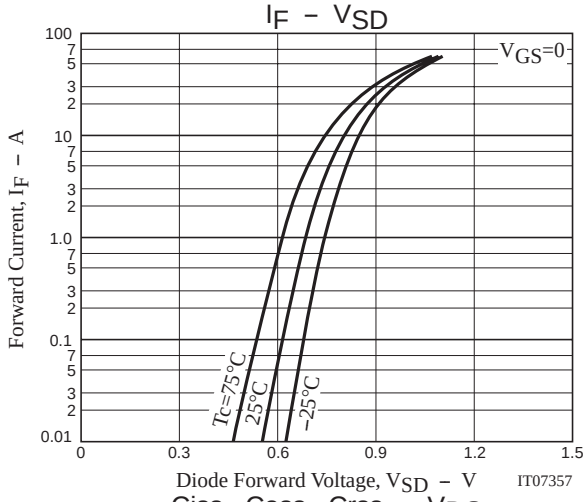

ID – VDS
Tc=25°C
10V
6V
4V
VGS=3V
Drain Current, ID – A
Drain-to-Source Voltage, VDS – V
IT07352

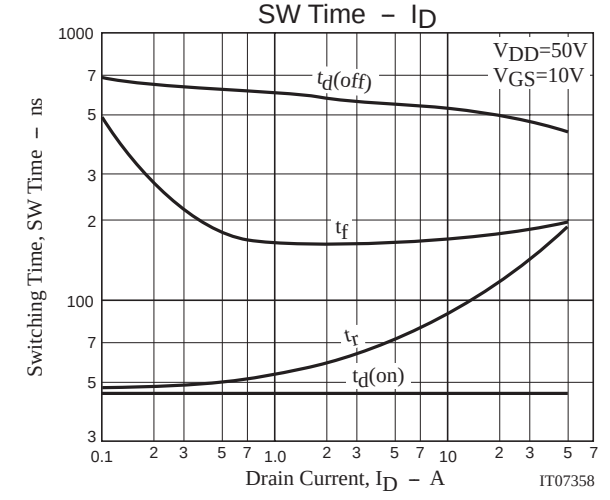

ID – VGS
VDS=10V
25°C
Tc=–25°C
75°C
Tc=75°C
–25°C
Drain Current, ID – A
Gate-to-Source Voltage, VGS – V
IT07353

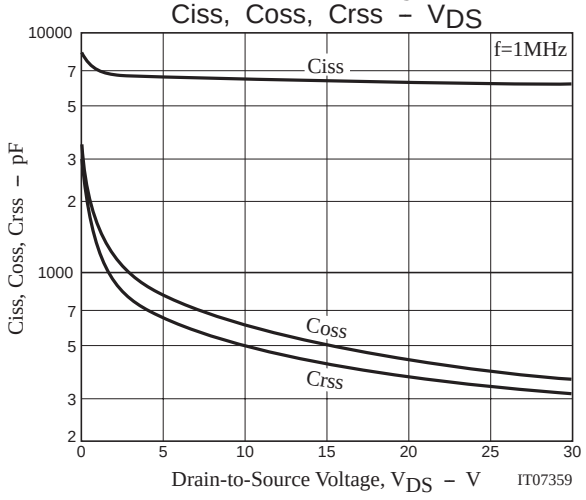

RDS(on) – VGS
ID=19A
Tc=75°C
25°C
–25°C
Static Drain-to-Source On-State Resistance, RDS(on) – mΩ
Gate-to-Source Voltage, VGS – V
IT07354

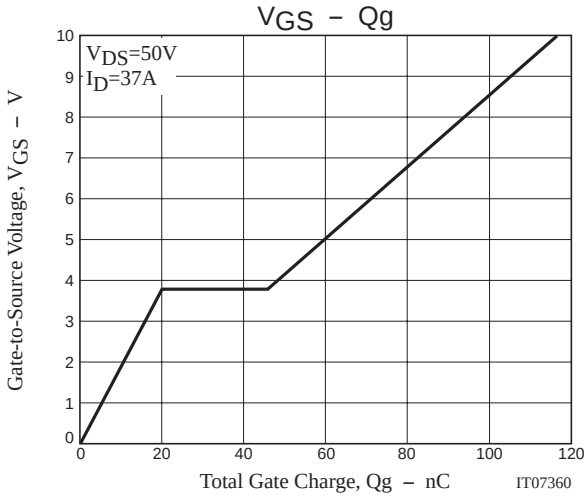

RDS(on) – Tc
ID=19A, VGS=4V
ID=19A, VGS=10V
Static Drain-to-Source On-State Resistance, RDS(on) – mΩ
Case Temperature, Tc – °C
IT07355

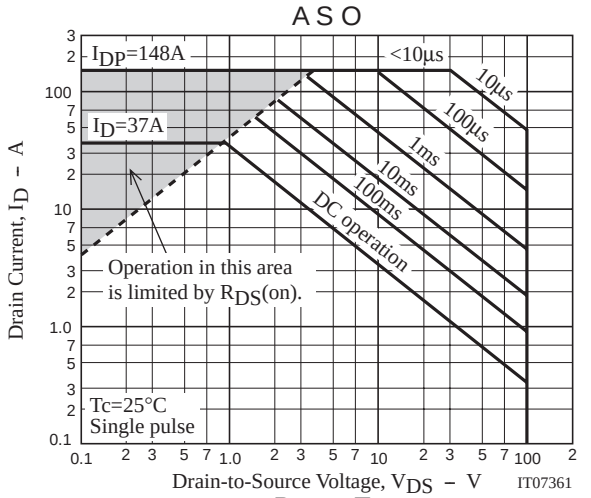

|yfs| – ID
VDS=10V
25°C
Tc=–25°C
75°C
Forward Transfer Admittance, |yfs| – S
Drain Current, ID – A
IT07356

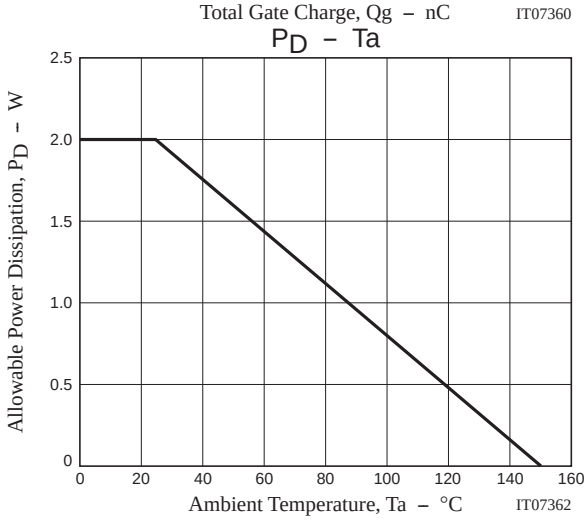

IF – VSD
VGS=0
Tc=75°C
25°C
–25°C
Forward Current, IF – A
Diode Forward Voltage, VSD – V
IT07357

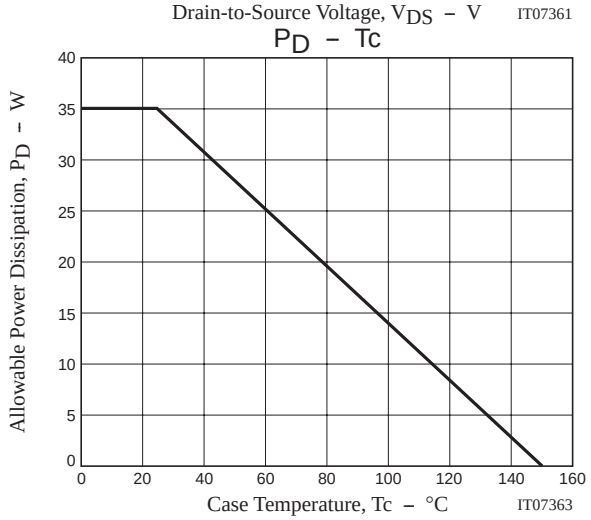

SW Time – ID
VDD=50V
VGS=10V
td(off)
tf
tr
td(on)
Switching Time, SW Time – ns
Drain Current, ID – A
IT07358


Ciss, Coss, Crss – VDS
f=1MHz
Ciss
Coss
Crss
Ciss, Coss, Crss – pF
Drain-to-Source Voltage, VDS – V
IT07359




Note on usage : Since the 2SK3709 is a MOSFET product, please avoid using this device in the vicinity of highly charged objects.

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