Ordering number : ENN8179

SANYO Semiconductors
DATA SHEET

N-Channel and P-Channel Silicon MOSFETs

# ECH8608 — General-Purpose Switching Device Applications

## Features

- The ECH8608 incorporates an N-channel MOSFET and a P-channel MOSFET that feature low ON-resistance and ultrahigh-speed switching, thereby enabling high-density mounting.
- 2.5V drive.

## Specifications

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

| Parameter | Symbol | Conditions | N-channel | P-channel | Unit |
|---|---|---|---|---|---|
| Drain-to-Source Voltage | $V_{DSS}$ | | 20 | -20 | V |
| Gate-to-Source Voltage | $V_{GSS}$ | | ±10 | ±10 | V |
| Drain Current (DC) | $I_D$ | | 6 | -4 | A |
| Drain Current (Pulse) | $I_{DP}$ | PW≤10μs, duty cycle≤1% | 40 | -40 | A |
| Allowable Power Dissipation | $P_D$ | Mounted on a ceramic board (900mm²X0.8mm)1unit | 1.3 | | W |
| Total Dissipation | $P_T$ | Mounted on a ceramic board (900mm²X0.8mm) | 1.5 | | W |
| Channel Temperature | Tch | | 150 | | °C |
| Storage Temperature | Tstg | | -55 to +150 | | °C |

### Electrical Characteristics at Ta=25°C

| Parameter | Symbol | Conditions | Ratings | | | Unit |
|---|---|---|---|---|---|---|
| | | | min | typ | max | |
| [N-channel] | | | | | | |
| Drain-to-Source Breakdown Voltage | $V_{(BR)DSS}$ | $I_D$=1mA, $V_{GS}$=0 | 20 | | | V |
| Zero-Gate Voltage Drain Current | $I_{DSS}$ | $V_{DS}$=20V, $V_{GS}$=0 | | | 1 | μA |
| Gate-to-Source Leakage Current | $I_{GSS}$ | $V_{GS}$=±8V, $V_{DS}$=0 | | | ±10 | μA |
| Cutoff Voltage | $V_{GS}$(off) | $V_{DS}$=10V, $I_D$=1mA | 0.5 | | 1.3 | V |
| Forward Transfer Admittance | \|yfs\| | $V_{DS}$=10V, $I_D$=3A | 7 | 10 | | S |
| Static Drain-to-Source On-State Resistance | $R_{DS}$(on)1 | $I_D$=3A, $V_{GS}$=4V | | 22 | 30 | mΩ |
| | $R_{DS}$(on)2 | $I_D$=1.5A, $V_{GS}$=2.5V | | 30 | 44 | mΩ |
| Input Capacitance | Ciss | $V_{DS}$=10V, f=1MHz | | 780 | | pF |
| Output Capacitance | Coss | $V_{DS}$=10V, f=1MHz | | 300 | | pF |
| Reverse Transfer Capacitance | Crss | $V_{DS}$=10V, f=1MHz | | 150 | | pF |

Marking : FA

Continued on next page.




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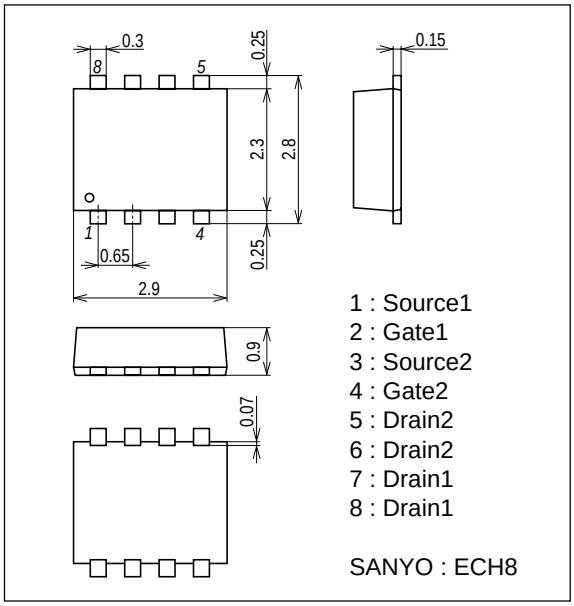
Continued from preceding page.

| Parameter | Symbol | Conditions | Ratings | | | Unit |
|---|---|---|---|---|---|---|
| | | | min | typ | max | |
| Turn-ON Delay Time | $t_{d(on)}$ | See specified Test Circuit. | | 19 | | ns |
| Rise Time | $t_r$ | See specified Test Circuit. | | 134 | | ns |
| Turn-OFF Delay Time | $t_{d(off)}$ | See specified Test Circuit. | | 90 | | ns |
| Fall Time | $t_f$ | See specified Test Circuit. | | 94 | | ns |
| Total Gate Charge | Qg | $V_{DS}$=10V, $V_{GS}$=10V, $I_D$=6A | | 23 | | nC |
| Gate-to-Source Charge | Qgs | $V_{DS}$=10V, $V_{GS}$=10V, $I_D$=6A | | 1.6 | | nC |
| Gate-to-Drain “Miller” Charge | Qgd | $V_{DS}$=10V, $V_{GS}$=10V, $I_D$=6A | | 3.6 | | nC |
| Diode Forward Voltage | $V_{SD}$ | $I_S$=6A, $V_{GS}$=0 | | 0.84 | 1.2 | V |
| [P-channel] | | | | | | |
| Drain-to-Source Breakdown Voltage | $V_{(BR)DSS}$ | $I_D$=−1mA, $V_{GS}$=0 | −20 | | | V |
| Zero-Gate Voltage Drain Current | $I_{DSS}$ | $V_{DS}$=−20V, $V_{GS}$=0 | | | −1 | μA |
| Gate-to-Source Leakage Current | $I_{GSS}$ | $V_{GS}$=±8V, $V_{DS}$=0 | | | ±10 | μA |
| Cutoff Voltage | $V_{GS(off)}$ | $V_{DS}$=−10V, $I_D$=−1mA | −0.4 | | −1.3 | V |
| Forward Transfer Admittance | $\|yfs\|$ | $V_{DS}$=−10V, $I_D$=−2A | 4.9 | 7 | | S |
| Static Drain-to-Source On-State Resistance | $R_{DS(on)1}$ | $I_D$=−2A, $V_{GS}$=−4.5V | | 37 | 54 | mΩ |
| | $R_{DS(on)2}$ | $I_D$=−1A, $V_{GS}$=−2.5V | | 58 | 87 | mΩ |
| Input Capacitance | Ciss | $V_{DS}$=−10V, f=1MHz | | 800 | | pF |
| Output Capacitance | Coss | $V_{DS}$=−10V, f=1MHz | | 210 | | pF |
| Reverse Transfer Capacitance | Crss | $V_{DS}$=−10V, f=1MHz | | 160 | | pF |
| Turn-ON Delay Time | $t_{d(on)}$ | See specified Test Circuit. | | 17 | | ns |
| Rise Time | $t_r$ | See specified Test Circuit. | | 197 | | ns |
| Turn-OFF Delay Time | $t_{d(off)}$ | See specified Test Circuit. | | 88 | | ns |
| Fall Time | $t_f$ | See specified Test Circuit. | | 128 | | ns |
| Total Gate Charge | Qg | $V_{DS}$=−10V, $V_{GS}$=−10V, $I_D$=−4A | | 21 | | nC |
| Gate-to-Source Charge | Qgs | $V_{DS}$=−10V, $V_{GS}$=−10V, $I_D$=−4A | | 1.4 | | nC |
| Gate-to-Drain “Miller” Charge | Qgd | $V_{DS}$=−10V, $V_{GS}$=−10V, $I_D$=−4A | | 3.2 | | nC |
| Diode Forward Voltage | $V_{SD}$ | $I_S$=−4A, $V_{GS}$=0 | | −0.82 | −1.2 | V |

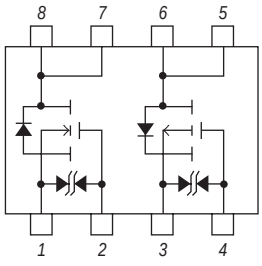
## Package Dimensions

unit : mm

2206B




## Electrical Connection

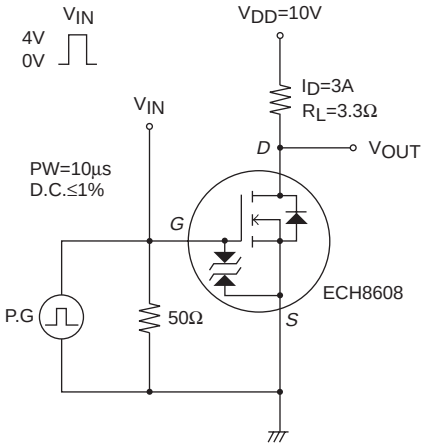



1 : Source1
2 : Gate1
3 : Source2
4 : Gate2
5 : Drain2
6 : Drain2
7 : Drain1
8 : Drain1

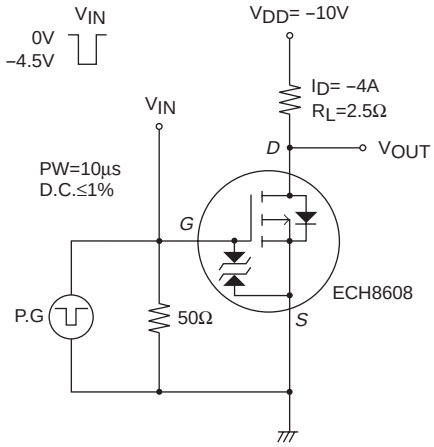
Top view

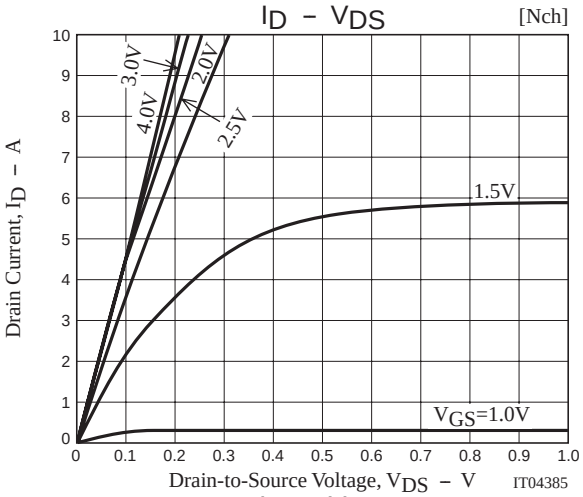
## Switching Time Test Circuit

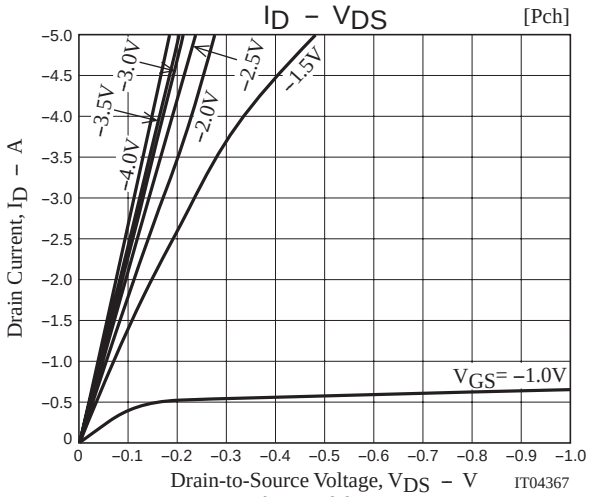
[N-channel]

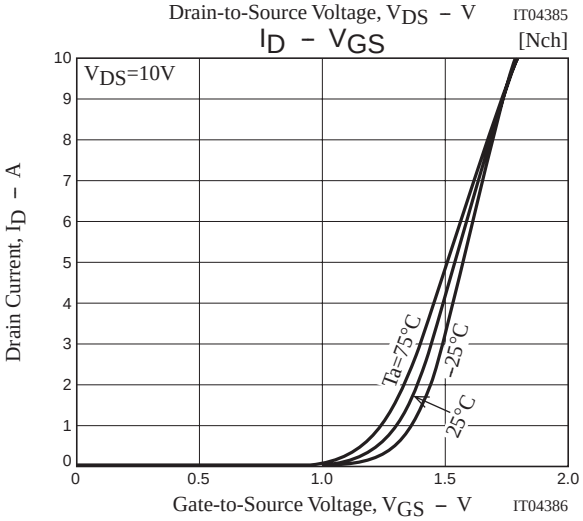


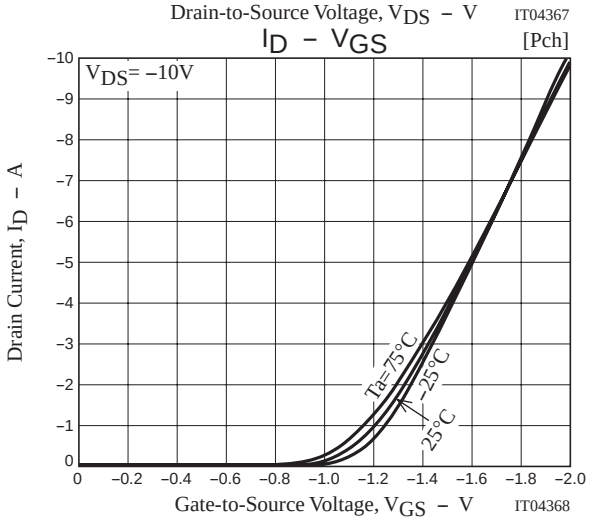

[P-channel]

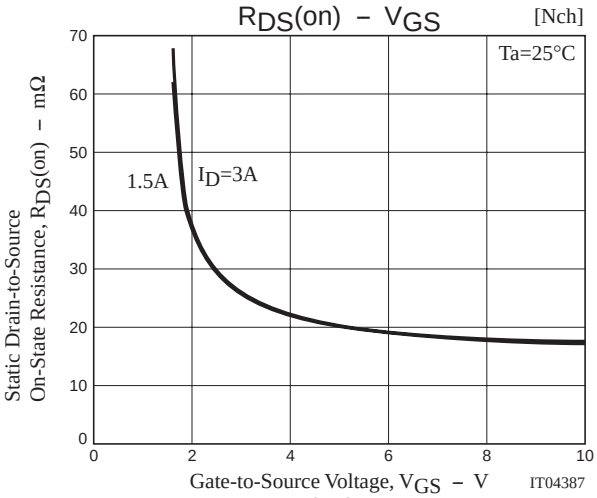


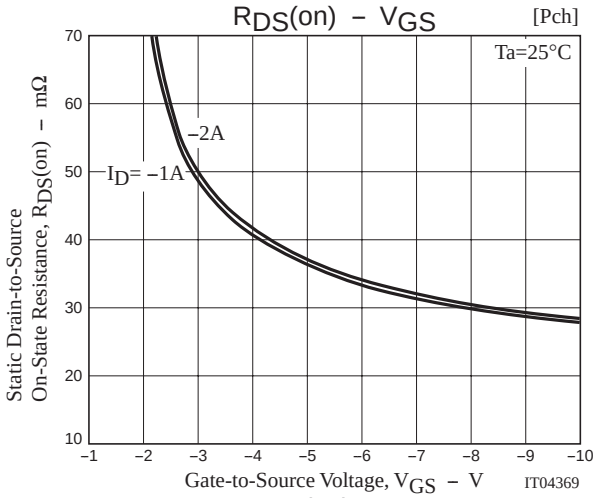



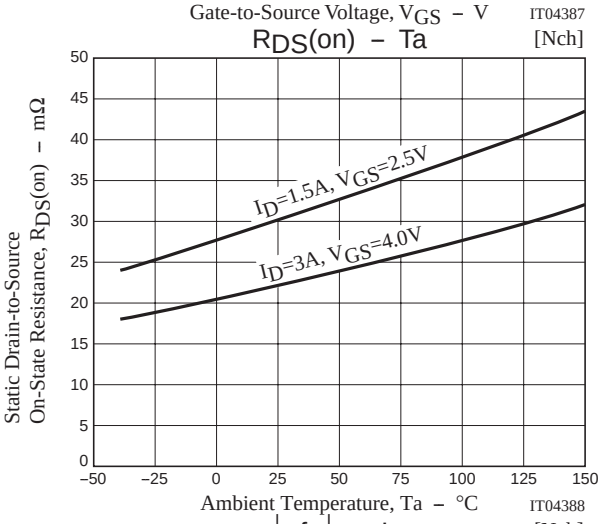



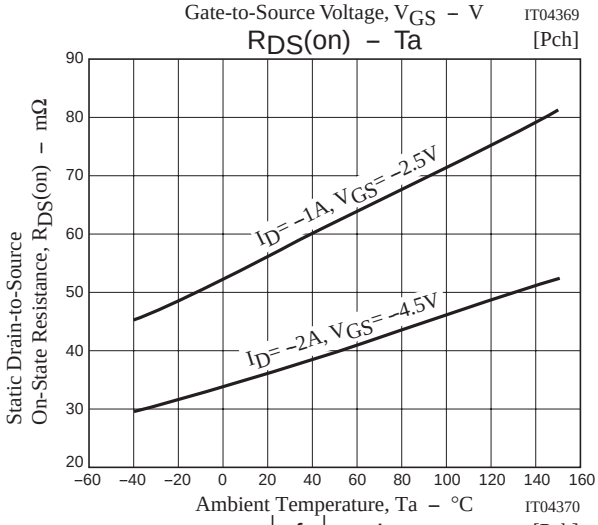



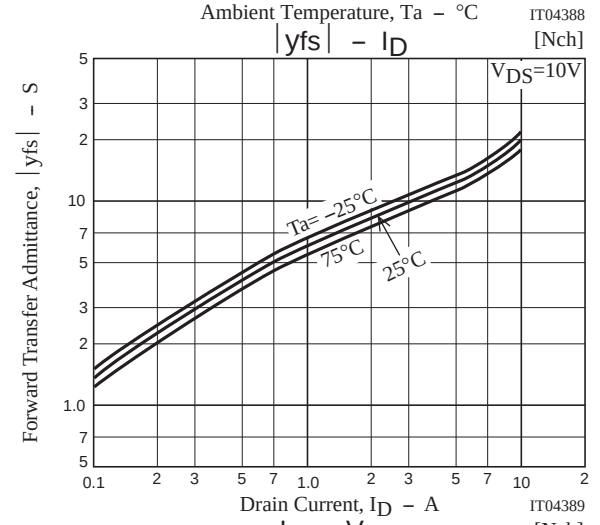



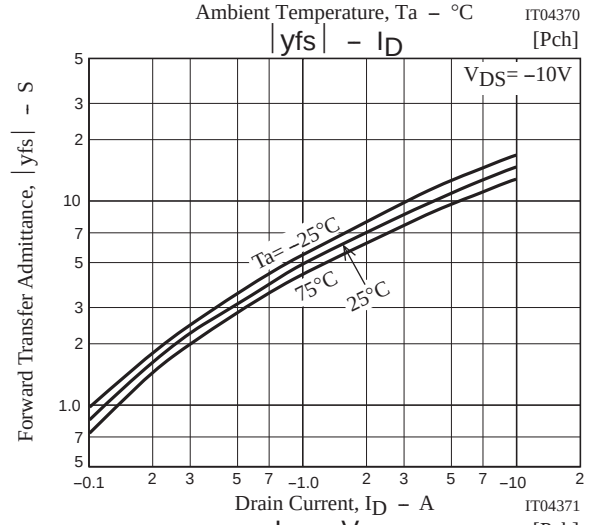

RDS(on) – VGS
[Nch]
Ta=25°C
1.5A
ID=3A
Static Drain-to-Source On-State Resistance, RDS(on) – mΩ
Gate-to-Source Voltage, VGS – V
IT04387

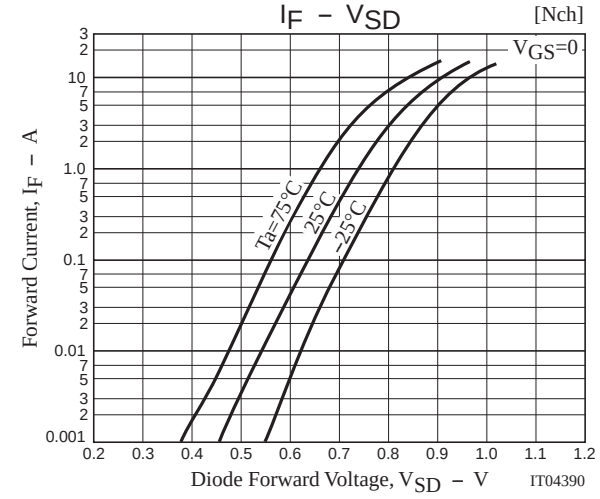

RDS(on) – VGS
[Pch]
Ta=25°C
–2A
ID= –1A
Static Drain-to-Source On-State Resistance, RDS(on) – mΩ
Gate-to-Source Voltage, VGS – V
IT04369

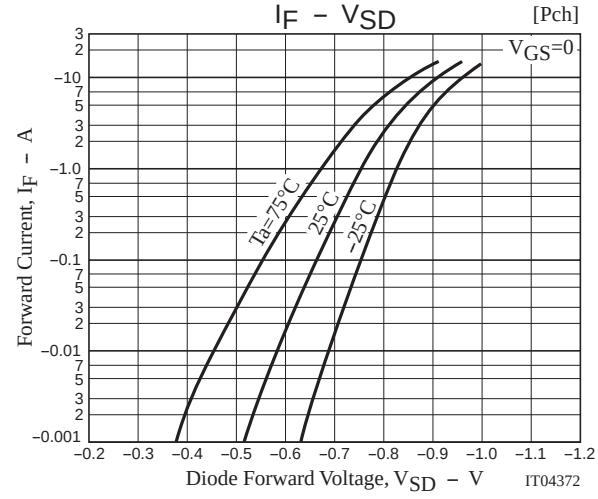

RDS(on) – Ta
[Nch]
ID=1.5A, VGS=2.5V
ID=3A, VGS=4.0V
Static Drain-to-Source On-State Resistance, RDS(on) – mΩ
Ambient Temperature, Ta – °C
IT04388


RDS(on) – Ta
[Pch]
ID= –1A, VGS= –2.5V
ID= –2A, VGS= –4.5V
Static Drain-to-Source On-State Resistance, RDS(on) – mΩ
Ambient Temperature, Ta – °C
IT04370

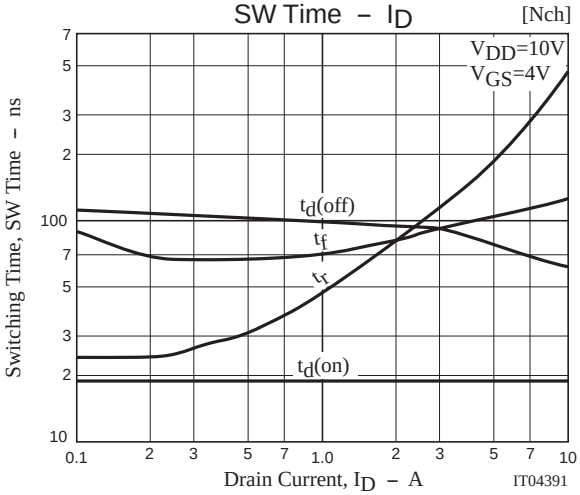

|yfs| – ID
[Nch]
VDS=10V
Ta= –25°C
75°C
25°C
Forward Transfer Admittance, |yfs| – S
Drain Current, ID – A
IT04389


|yfs| – ID
[Pch]
VDS= –10V
Ta= –25°C
75°C
25°C
Forward Transfer Admittance, |yfs| – S
Drain Current, ID – A
IT04371

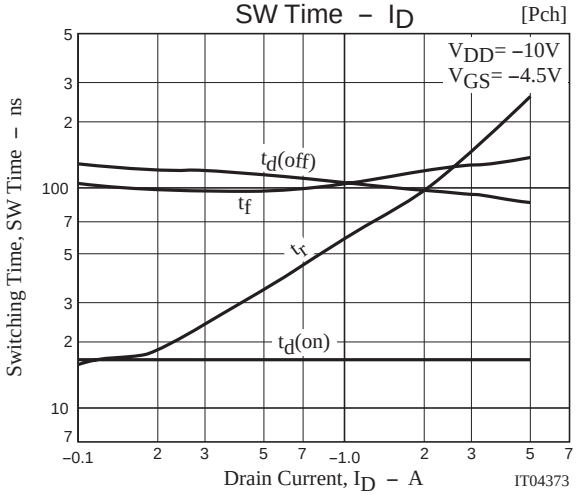

IF – VSD
[Nch]
VGS=0
Ta=75°C
25°C
–25°C
Forward Current, IF – A
Diode Forward Voltage, VSD – V
IT04390


IF – VSD
[Pch]
VGS=0
Ta=75°C
25°C
–25°C
Forward Current, IF – A
Diode Forward Voltage, VSD – V
IT04372

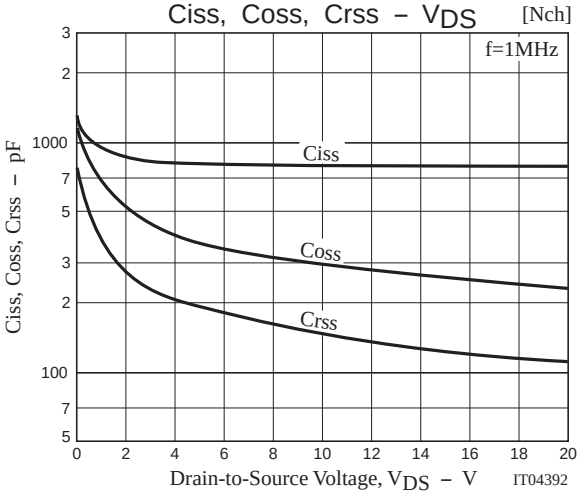
SW Time – $I_D$ [Nch]



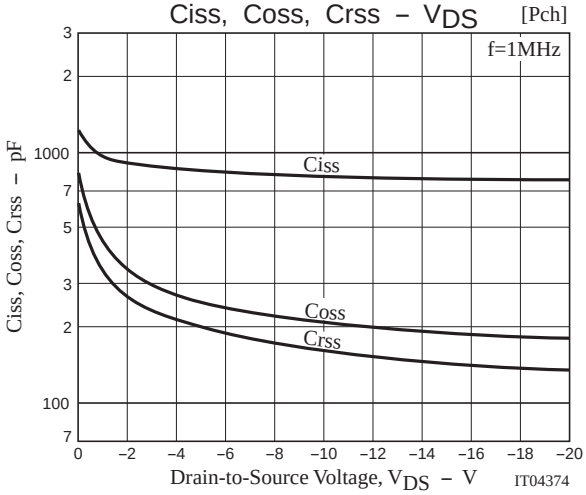

SW Time – $I_D$ [Pch]



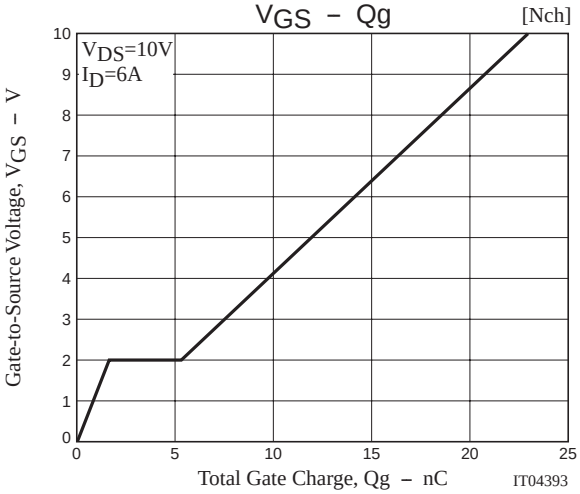

Ciss, Coss, Crss – $V_{DS}$ [Nch]



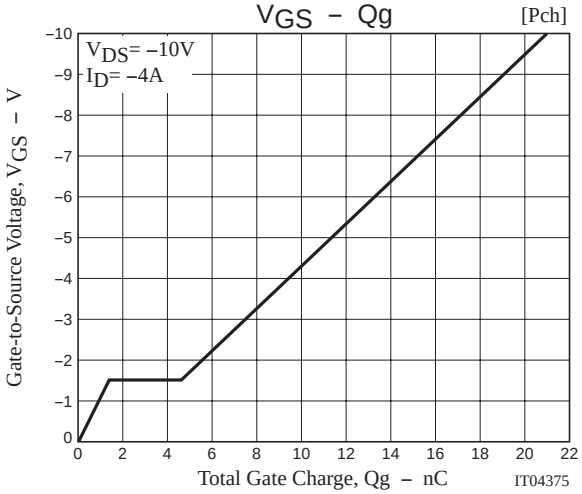

Ciss, Coss, Crss – $V_{DS}$ [Pch]



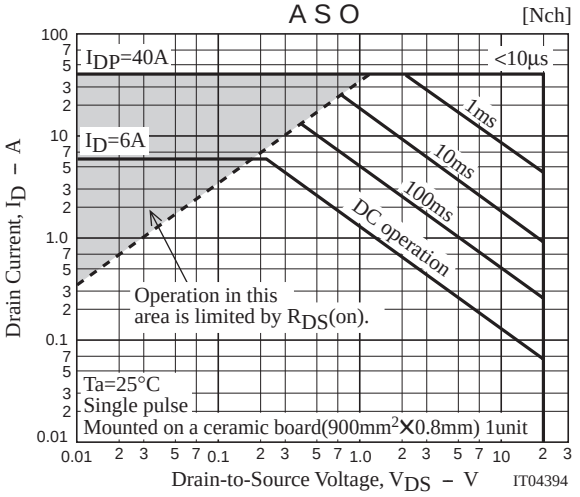

$V_{GS}$ – Qg [Nch]



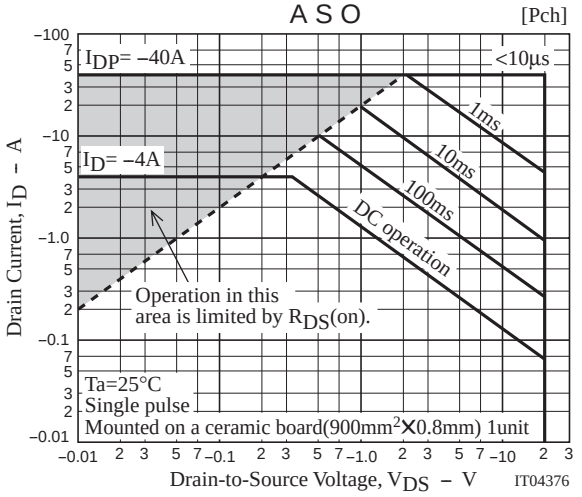

$V_{GS}$ – Qg [Pch]

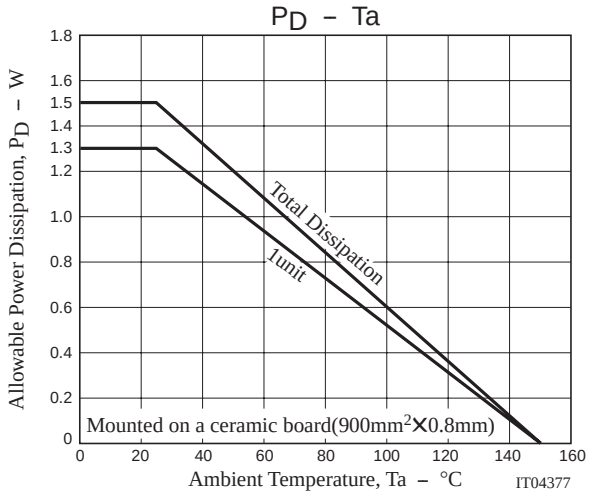



A S O [Nch]




A S O [Pch]






Note on usage : Since the ECH8608 is a MOSFET product, please avoid using this device in the vicinity of highly charged objects.