Ordering number : ENA0781

SANYO Semiconductors
DATA SHEET

# MCH5837 — General-Purpose Switching Device Applications

MOSFET : N-Channel Silicon MOSFET
SBD : Schottky Barrier Diode

## Features

- Composite type with an N-channel silicon MOSFET and a schottky barrier diode (SS10015M) contained in one package facilitating high-density mounting.
- [MOSFET]
  - Low ON-resistance.
  - 1.8V drive.
- [SBD]
  - Short reverse recovery time.
  - Low forward voltage.

## Specifications

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

| Parameter | Symbol | Conditions | Ratings | Unit |
|---|---|---|---|---|
| [MOSFET] | | | | |
| Drain-to-Source Voltage | $V_{DSS}$ | | 20 | V |
| Gate-to-Source Voltage | $V_{GSS}$ | | ±10 | V |
| Drain Current (DC) | $I_D$ | | 2 | A |
| Drain Current (Pulse) | $I_{DP}$ | PW≤10μs, duty cycle≤1% | 8 | A |
| Allowable Power Dissipation | $P_D$ | Mounted on a ceramic board (900mm²×0.8mm) 1unit | 0.8 | W |
| Channel Temperature | Tch | | 150 | °C |
| Storage Temperature | Tstg | | −55 to +125 | °C |

Marking : YB

Continued on next page.



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| Parameter | Symbol | Conditions | Ratings | Unit |
|---|---|---|---|---|
| [SBD] | | | | |
| Repetitive Peak Reverse Voltage | $V_{RRM}$ | | 15 | V |
| Nonrepetitive Peak Reverse Surge Voltage | $V_{RSM}$ | | 15 | V |
| Average Output Current | $I_O$ | | 1 | A |
| Surge Forward Current | $I_{FSM}$ | 50Hz sine wave, 1 cycle | 3 | A |
| Junction Temperature | Tj | | −55 to +125 | °C |
| Storage Temperature | Tstg | | −55 to +125 | °C |

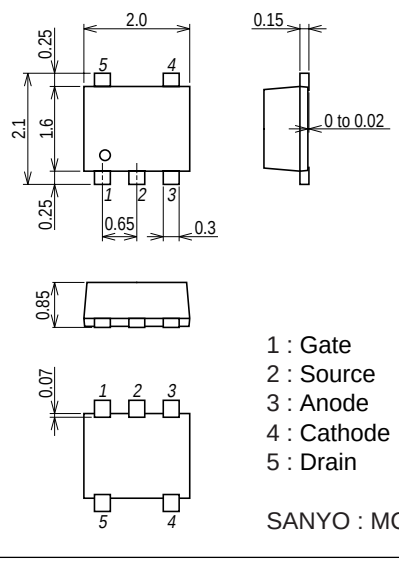
## Electrical Characteristics at Ta=25°C

| Parameter | Symbol | Conditions | Ratings | | | Unit |
|---|---|---|---|---|---|---|
| | | | min | typ | max | |
| [MOSFET] | | | | | | |
| Drain-to-Source Breakdown Voltage | $V_{(BR)DSS}$ | $I_D$=1mA, $V_{GS}$=0V | 20 | | | V |
| Zero-Gate Voltage Drain Current | $I_{DSS}$ | $V_{DS}$=20V, $V_{GS}$=0V | | | 1 | μA |
| Gate-to-Source Leakage Current | $I_{GSS}$ | $V_{GS}$=±8V, $V_{DS}$=0V | | | ±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, $I_D$=1A | 1.4 | 2.4 | | S |
| Static Drain-to-Source On-State Resistance | $R_{DS}$(on)1 | $I_D$=1A, $V_{GS}$=4V | | 110 | 145 | mΩ |
| | $R_{DS}$(on)2 | $I_D$=0.5A, $V_{GS}$=2.5V | | 150 | 215 | mΩ |
| | $R_{DS}$(on)3 | $I_D$=0.1A, $V_{GS}$=1.8V | | 210 | 320 | mΩ |
| Input Capacitance | Ciss | $V_{DS}$=10V, f=1MHz | | 115 | | pF |
| Output Capacitance | Coss | $V_{DS}$=10V, f=1MHz | | 35 | | pF |
| Reverse Transfer Capacitance | Crss | $V_{DS}$=10V, f=1MHz | | 25 | | pF |
| Turn-ON Delay Time | $t_d$(on) | See specified Test Circuit. | | 7.5 | | ns |
| Rise Time | $t_r$ | See specified Test Circuit. | | 27 | | ns |
| Turn-OFF Delay Time | $t_d$(off) | See specified Test Circuit. | | 20 | | ns |
| Fall Time | $t_f$ | See specified Test Circuit. | | 30 | | ns |
| Total Gate Charge | Qg | $V_{DS}$=10V, $V_{GS}$=4V, $I_D$=2A | | 1.8 | | nC |
| Gate-to-Source Charge | Qgs | $V_{DS}$=10V, $V_{GS}$=4V, $I_D$=2A | | 0.35 | | nC |
| Gate-to-Drain “Miller” Charge | Qgd | $V_{DS}$=10V, $V_{GS}$=4V, $I_D$=2A | | 0.5 | | nC |
| Diode Forward Voltage | $V_{SD}$ | $I_S$=2A, $V_{GS}$=0V | | 0.86 | 1.2 | V |
| [SBD] | | | | | | |
| Reverse Voltage | $V_R$ | $I_R$=0.5mA | 15 | | | V |
| Forward Voltage | $V_F$1 | $I_F$=0.3A | | 0.3 | 0.33 | V |
| | $V_F$2 | $I_F$=0.5A | | 0.33 | 0.36 | V |
| Reverse Current | $I_R$ | $V_R$=6V | | | 90 | μA |
| Interterminal Capacitance | C | $V_R$=10V, f=1MHz | | 20 | | pF |
| Reverse Recovery Time | $t_{rr}$ | $I_F$=$I_R$=100mA, See specified Test Circuit. | | | 10 | ns |

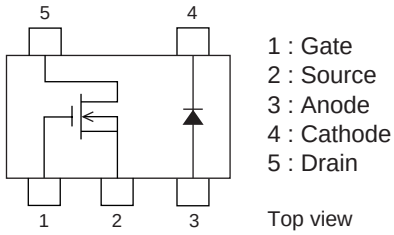
## Package Dimensions

unit : mm (typ)

7021A-008

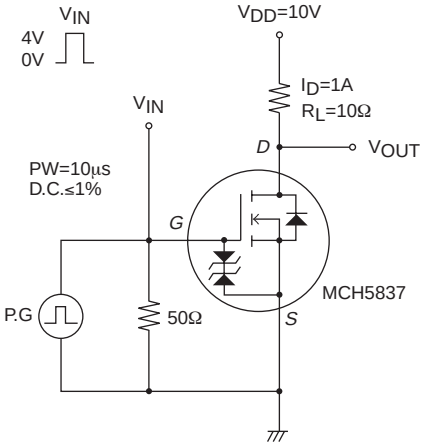



## Electrical Connection



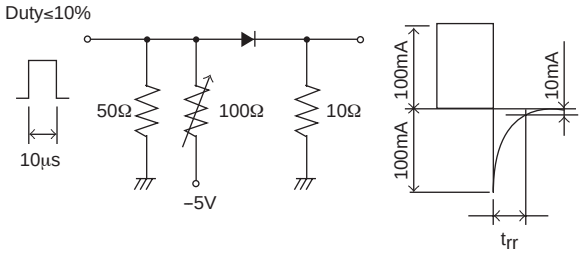
## Switching Time Test Circuit

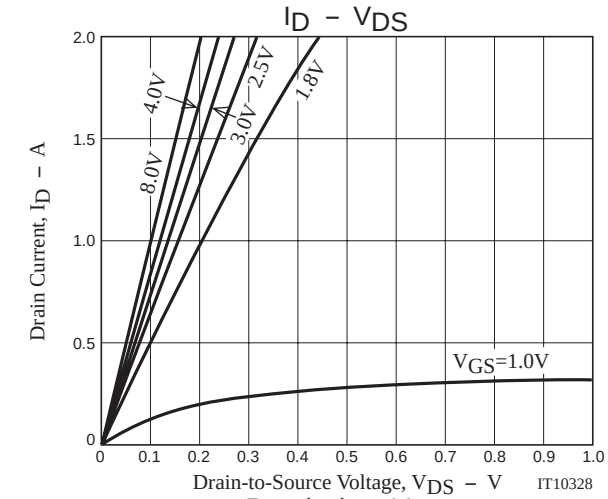
[MOSFET]

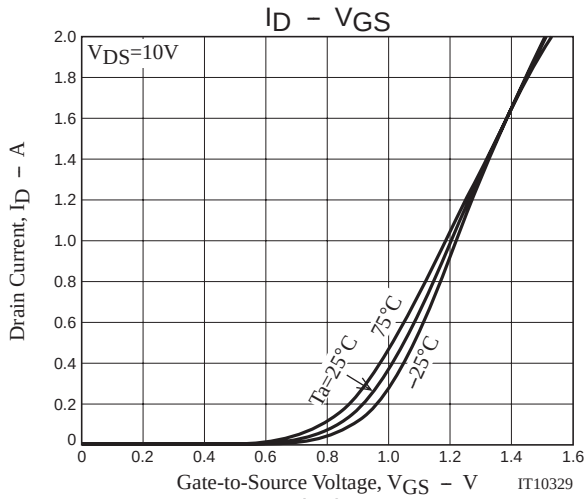


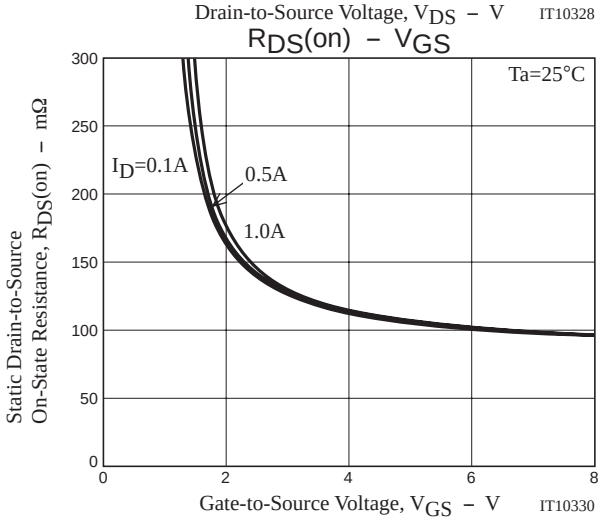

## $t_{rr}$ Test Circuit

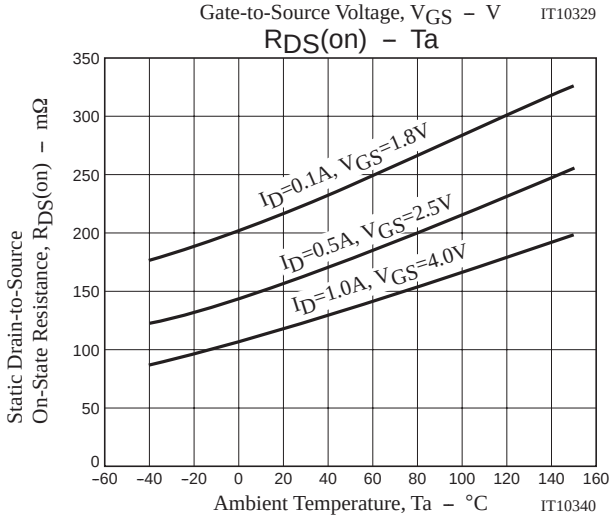
[SBD]

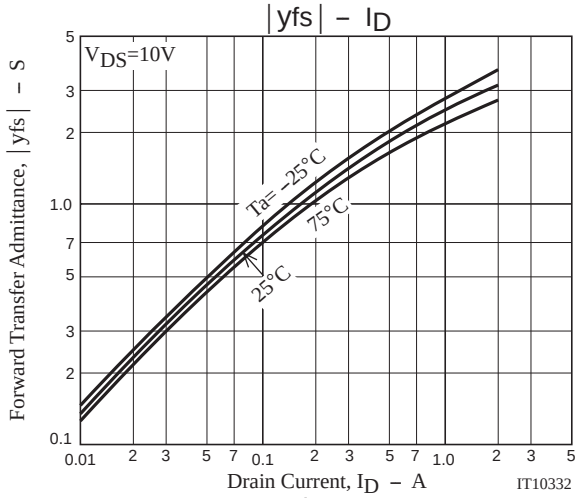


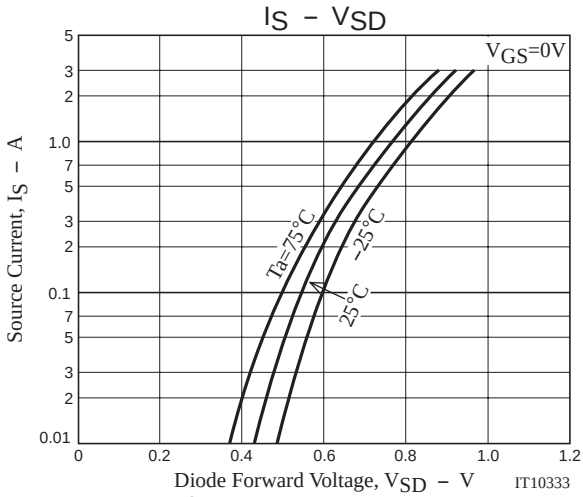



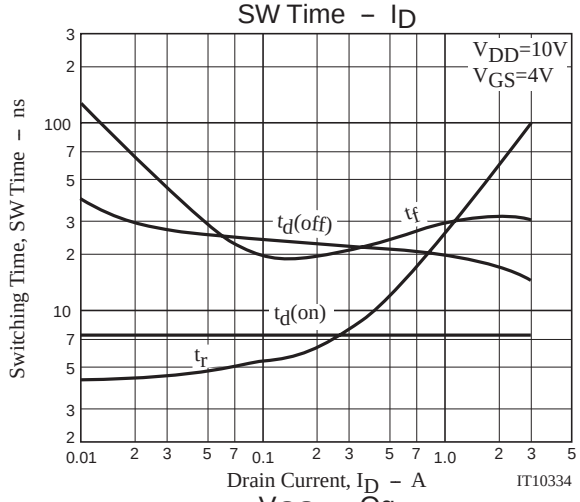



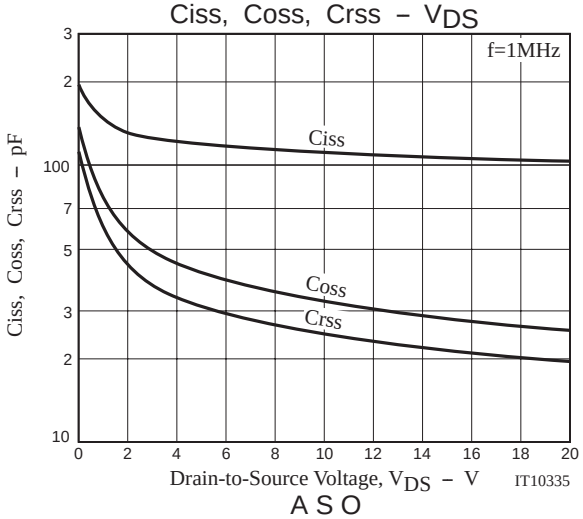



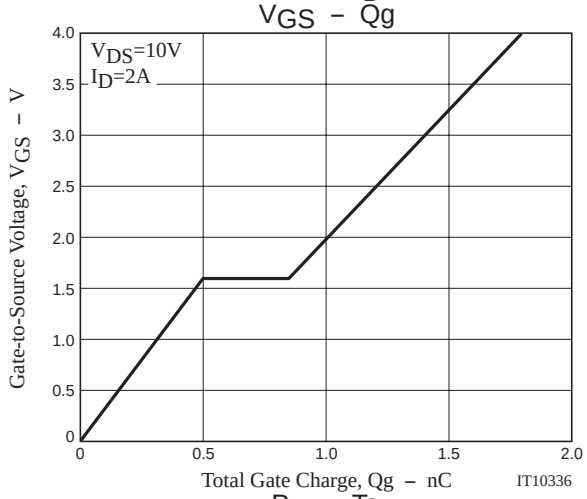



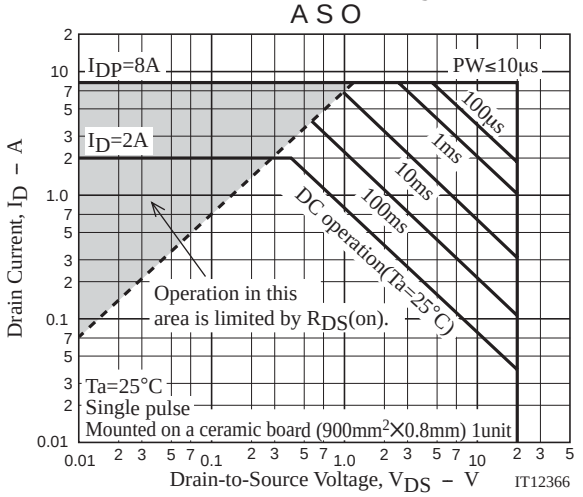

|yfs| – ID
VDS=10V
Ta= –25°C
75°C
25°C
Forward Transfer Admittance, |yfs| – S
Drain Current, ID – A
IT10332

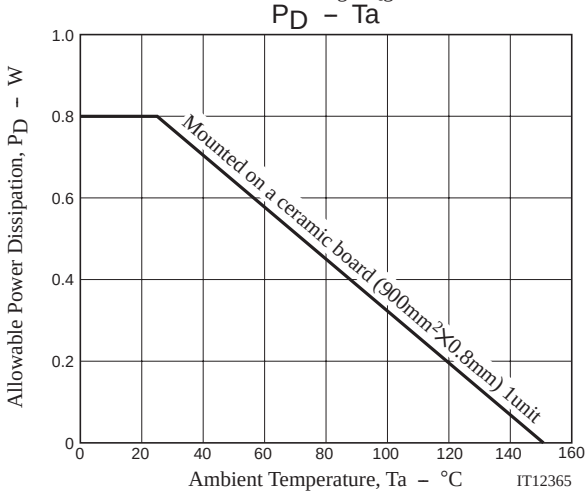

IS – VSD
VGS=0V
Ta=75°C
–25°C
25°C
Source Current, IS – A
Diode Forward Voltage, VSD – V
IT10333

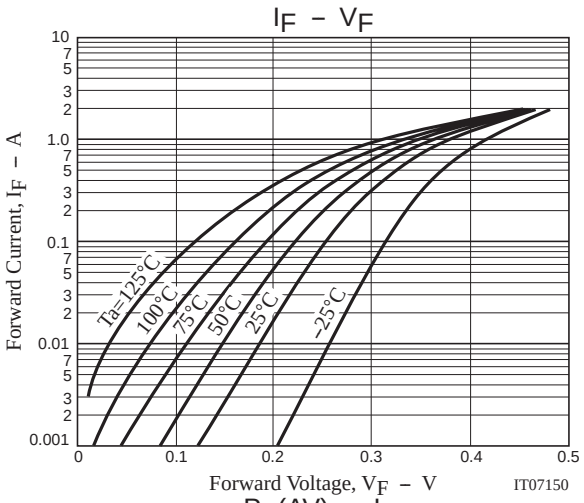

SW Time – ID
VDD=10V
VGS=4V
td(off)
tf
td(on)
tr
Switching Time, SW Time – ns
Drain Current, ID – A
IT10334

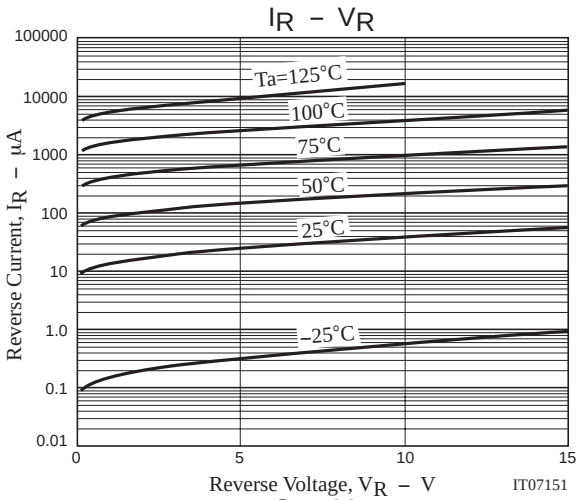

Ciss, Coss, Crss – VDS
f=1MHz
Ciss
Coss
Crss
Ciss, Coss, Crss – pF
Drain-to-Source Voltage, VDS – V
IT10335

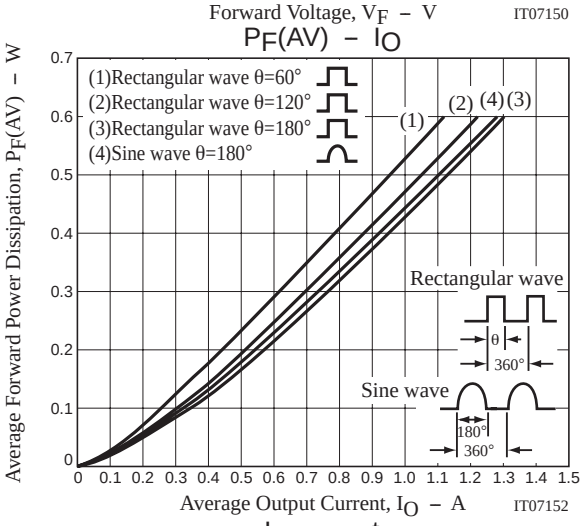

VGS – Qg
VDS=10V
ID=2A
Gate-to-Source Voltage, VGS – V
Total Gate Charge, Qg – nC
IT10336

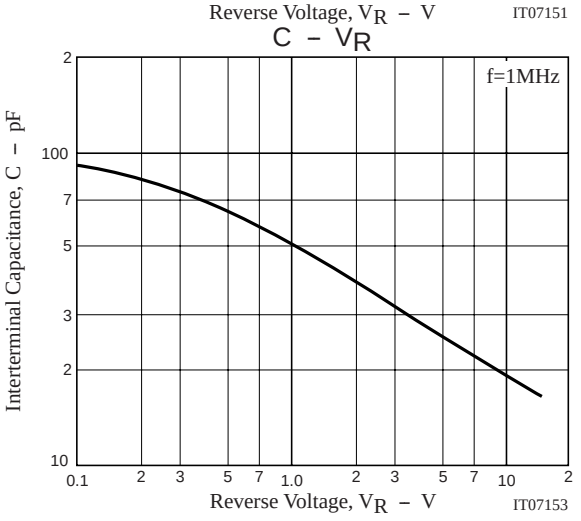

A S O
IDP=8A
PW≤10μs
ID=2A
100μs
1ms
10ms
100ms
DC operation(Ta=25°C)
Operation in this
area is limited by RDS(on).
Ta=25°C
Single pulse
Mounted on a ceramic board (900mm2×0.8mm) 1unit
Drain Current, ID – A
Drain-to-Source Voltage, VDS – V
IT12366

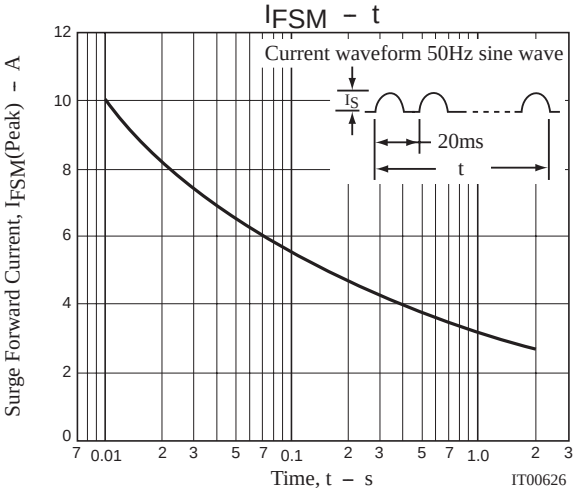

PD – Ta
Mounted on a ceramic board (900mm2×0.8mm) 1unit
Allowable Power Dissipation, PD – W
Ambient Temperature, Ta – °C
IT12365


IF – VF
Forward Current, IF – A
Forward Voltage, VF – V
Ta=125°C
100°C
75°C
50°C
25°C
–25°C
IT07150


IR – VR
Reverse Current, IR – μA
Reverse Voltage, VR – V
Ta=125°C
100°C
75°C
50°C
25°C
–25°C
IT07151


PF(AV) – IO
Average Forward Power Dissipation, PF(AV) – W
Average Output Current, IO – A
(1)Rectangular wave θ=60°
(2)Rectangular wave θ=120°
(3)Rectangular wave θ=180°
(4)Sine wave θ=180°
Rectangular wave
Sine wave
IT07152


C – VR
Interterminal Capacitance, C – pF
Reverse Voltage, VR – V
f=1MHz
IT07153


IFSM – t
Surge Forward Current, IFSM(Peak) – A
Time, t – s
Current waveform 50Hz sine wave
20ms
IT00626

Note on usage : Since the MCH5837 is a MOSFET product, please avoid using this device in the vicinity of highly charged objects.



This catalog provides information as of April, 2007. Specifications and information herein are subject to change without notice.