Ordering number : ENN6980

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

# CPH5804

## DC / DC Converter Applications

## Features

- Composite type with a P-Channel Sillicon MOSFET (MCH3312) and a Schottky Barrier Diode (SBS006M) contained in one package facilitating high-density mounting.

[MOSFET]

- Low ON-resistance.
- Ultrahigh-speed switching.
- 4V drive.

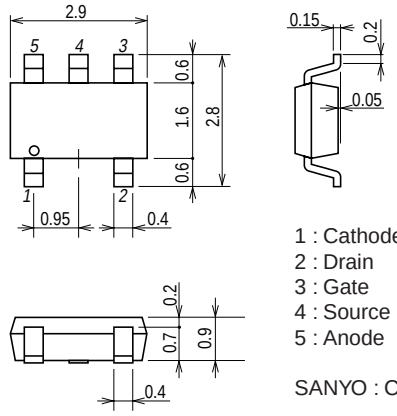
[SBD]

- Short reverse recovery time.
- Low forward voltage.

## Package Dimensions

unit : mm
2171

[CPH5804]




1 : Cathode
2 : Drain
3 : Gate
4 : Source
5 : Anode

SANYO : CPH5

## Specifications

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

| Parameter | Symbol | Conditions | Ratings | Unit |
|---|---|---|---|---|
| [MOSFET] | | | | |
| Drain-to-Source Voltage | $V_{DSS}$ | | −30 | V |
| Gate-to-Source Voltage | $V_{GSS}$ | | ±20 | 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 (600mm²×0.8mm) 1unit | 0.9 | W |
| Channel Temperature | Tch | | 150 | °C |
| Storage Temperature | Tstg | | −55 to +125 | °C |
| [SBD] | | | | |
| Repetitive Peak Reverse Voltage | $V_{RRM}$ | | 30 | V |
| Nonrepetitive Peak Reverse Surge Voltage | $V_{RSM}$ | | 30 | V |
| Average Output Current | $I_O$ | | 0.5 | A |
| Surge Forward Current | $I_{FSM}$ | 50Hz sine wave, 1 cycle | 10 | A |
| Junction Temperature | Tj | | −55 to +125 | °C |
| Storage Temperature | Tstg | | −55 to +125 | °C |

Marking : QE

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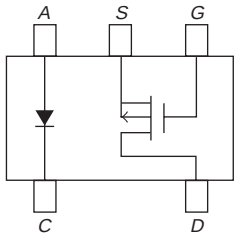
TOKYO OFFICE Tokyo Bldg., 1-10, 1 Chome, Ueno, Taito-ku, TOKYO, 110-8534 JAPAN

## 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, $V_{GS}$=0 | –30 | | | V |
| Zero-Gate Voltage Drain Current | $I_{DSS}$ | $V_{DS}$=–30V, $V_{GS}$=0 | | | –1 | μA |
| Gate-to-Source Leakage Current | $I_{GSS}$ | $V_{GSS}$=±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, $I_D$=–1A | 1.4 | 2.0 | | S |
| Static Drain-to-Source On-State Resistance | $R_{DS}$(on)1 | $I_D$=–1A, $V_{GS}$=–10V | | 110 | 145 | mΩ |
| | $R_{DS}$(on)2 | $I_D$=–500mA, $V_{GS}$=–4V | | 205 | 290 | mΩ |
| Input Capacitance | Ciss | $V_{DS}$=–10V, f=1MHz | | 200 | | pF |
| Output Capacitance | Coss | $V_{DS}$=–10V, f=1MHz | | 47 | | pF |
| Reverse Transfer Capacitance | Crss | $V_{DS}$=–10V, f=1MHz | | 32 | | pF |
| Turn-ON Delay Time | $t_d$(on) | See specified Test Circuit | | 7.2 | | ns |
| Rise Time | $t_r$ | See specified Test Circuit | | 2.9 | | ns |
| Turn-OFF Delay Time | $t_d$(off) | See specified Test Circuit | | 21 | | ns |
| Fall Time | $t_f$ | See specified Test Circuit | | 8.7 | | ns |
| Total Gate Charge | Qg | $V_{DS}$=–10V, $V_{GS}$=–10V, $I_D$=–2A | | 5.5 | | nC |
| Gate-to-Source Charge | Qgs | $V_{DS}$=–10V, $V_{GS}$=–10V, $I_D$=–2A | | 0.98 | | nC |
| Gate-to-Drain “Miller” Charge | Qgd | $V_{DS}$=–10V, $V_{GS}$=–10V, $I_D$=–2A | | 0.82 | | nC |
| Diode Forward Voltage | $V_{SD}$ | $I_S$=–2A, $V_{GS}$=0 | | –0.85 | –1.5 | V |
| [SBD] | | | | | | |
| Reverse Voltage | $V_R$ | $I_R$=0.5mA | 30 | | | V |
| Forward Voltage | $V_F$1 | $I_F$=0.3A | | 0.35 | 0.4 | V |
| | $V_F$2 | $I_F$=0.5A | | 0.42 | 0.47 | V |
| Reverse Current | $I_R$ | $V_R$=10V | | | 200 | μA |
| Interterminal Capacitance | C | $V_R$=10V, f=1MHz, 1 cycle | | 20 | | pF |
| Reverse Recovery Time | $t_{rr}$ | $I_F$=$I_R$=100mA, See specified Test Circuit. | | | 10 | ns |

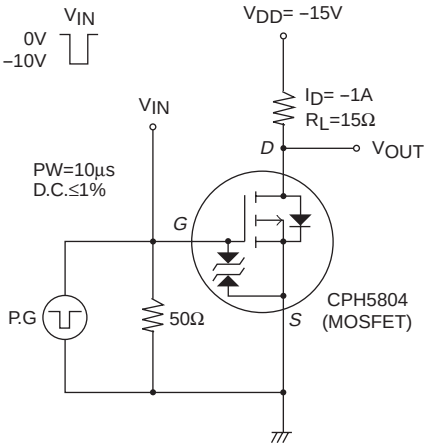
## Electrical Connection (Top view)




G : Gate
S : Source
A : Anode
C : Cathode
D : Drain

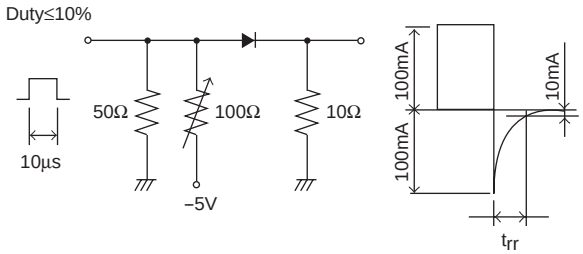
## Switching Time Test Circuit

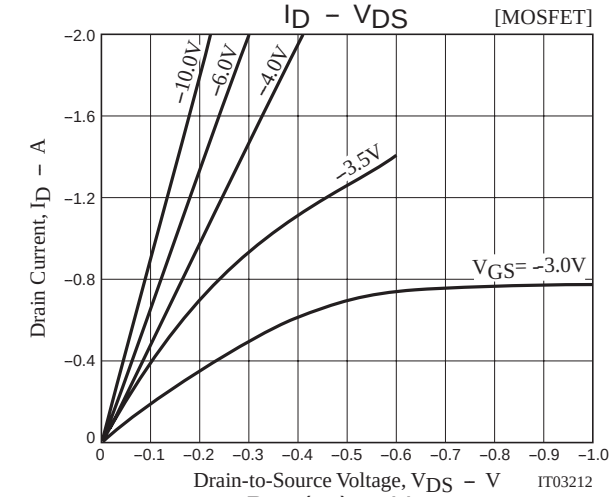
[MOSFET]

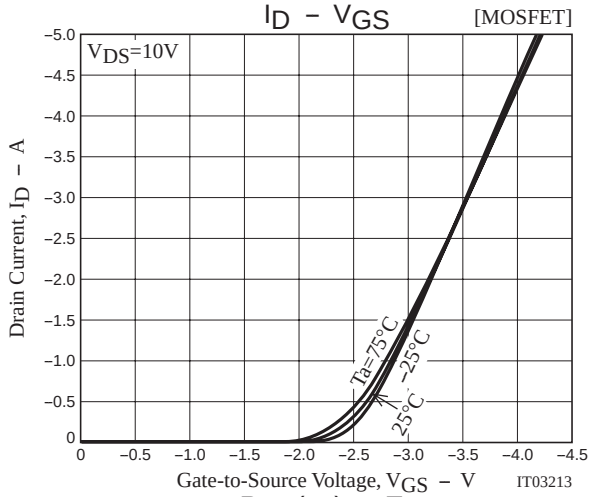


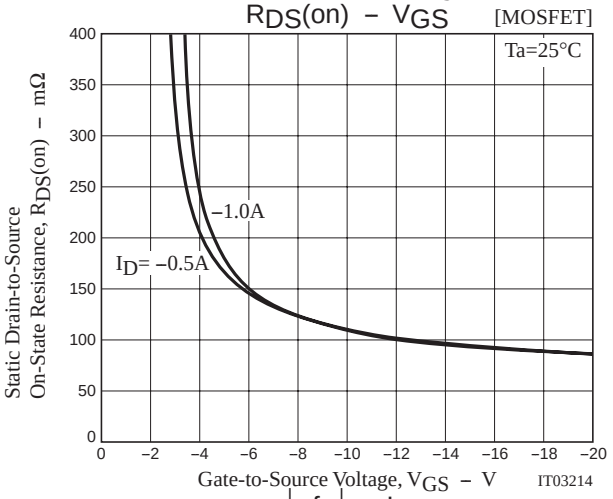

## trr Test Circuit

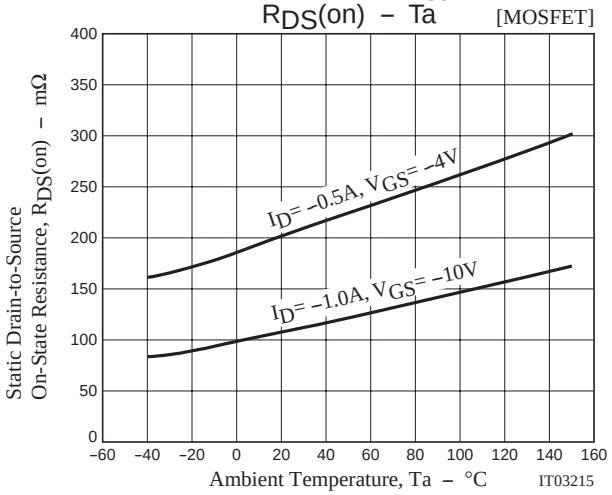
[SBD]

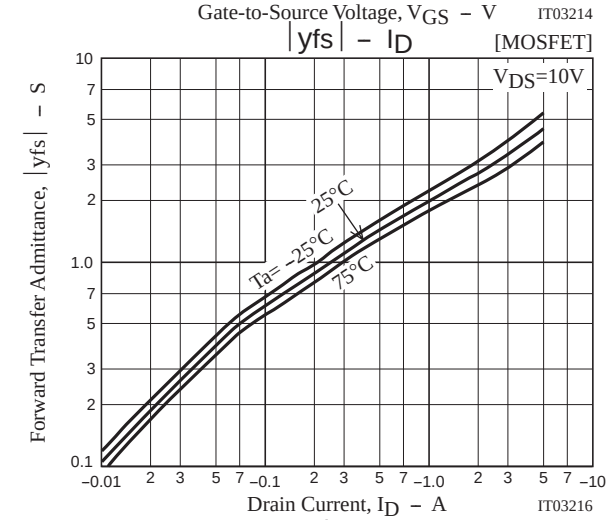


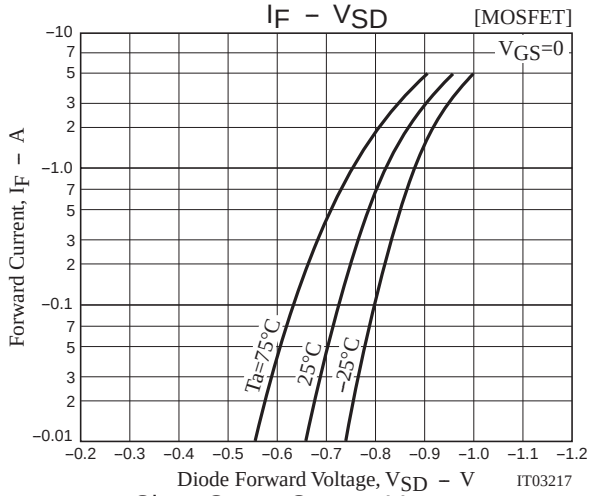

ID – VDS [MOSFET]
Drain Current, ID – A
Drain-to-Source Voltage, VDS – V
IT03212
–10.0V
–6.0V
–4.0V
–3.5V
VGS= –3.0V

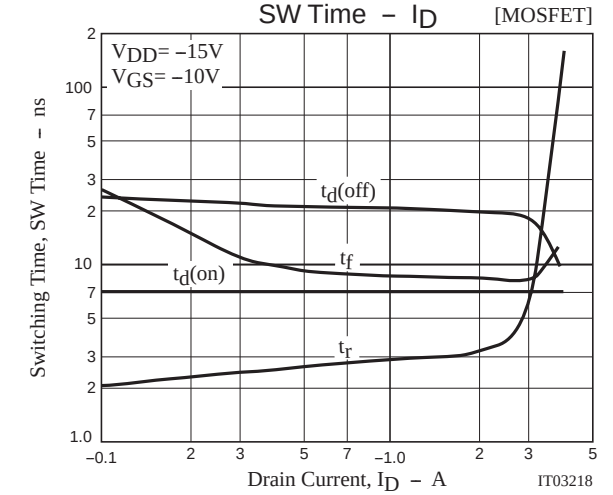

ID – VGS [MOSFET]
VDS=10V
Drain Current, ID – A
Gate-to-Source Voltage, VGS – V
IT03213
Ta=75°C
–25°C
25°C

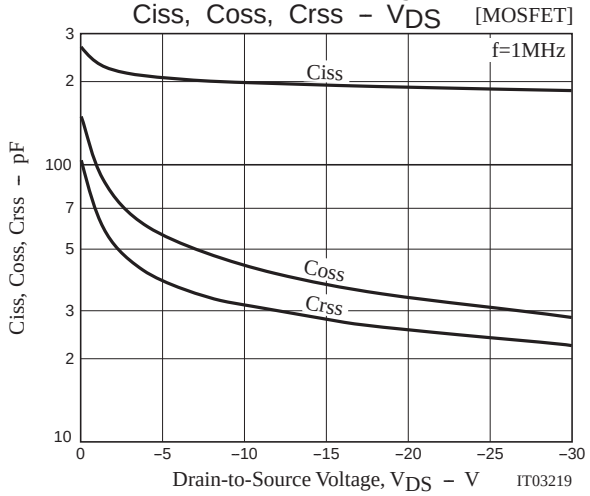

RDS(on) – VGS [MOSFET]
Ta=25°C
Static Drain-to-Source On-State Resistance, RDS(on) – mΩ
Gate-to-Source Voltage, VGS – V
IT03214
–1.0A
ID= –0.5A

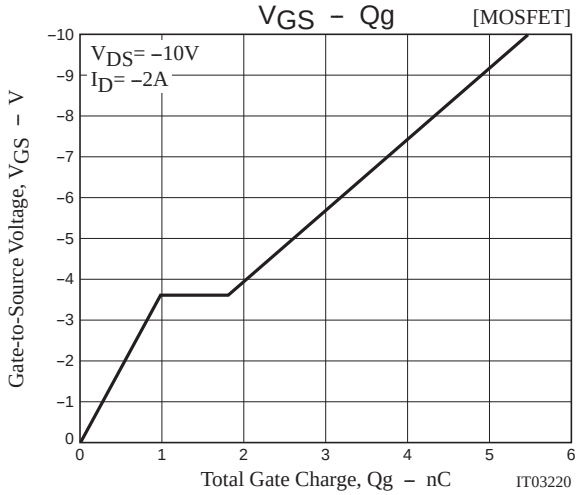

RDS(on) – Ta [MOSFET]
Static Drain-to-Source On-State Resistance, RDS(on) – mΩ
Ambient Temperature, Ta – °C
IT03215
ID= –0.5A, VGS= –4V
ID= –1.0A, VGS= –10V

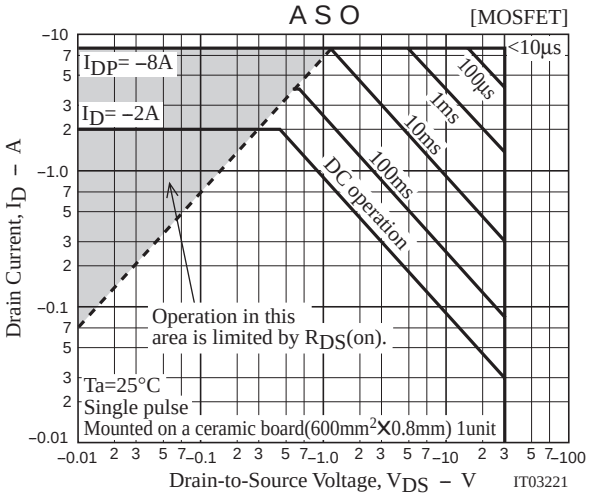

|yfs| – ID [MOSFET]
VDS=10V
Forward Transfer Admittance, |yfs| – S
Drain Current, ID – A
IT03216
25°C
Ta= –25°C
75°C

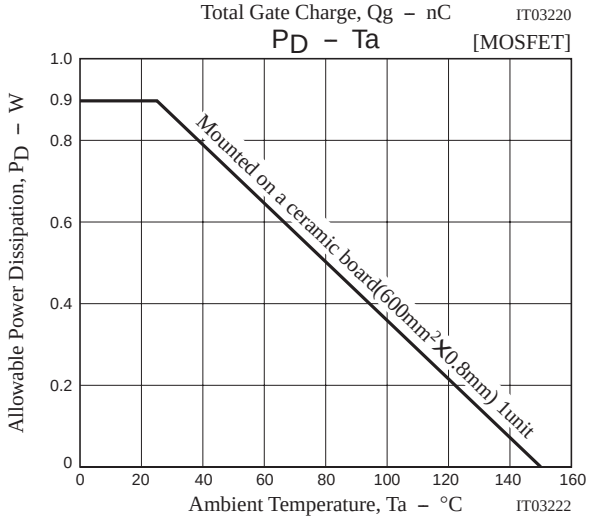

IF – VSD [MOSFET]
VGS=0
Forward Current, IF – A
Diode Forward Voltage, VSD – V
IT03217
Ta=75°C
25°C
–25°C

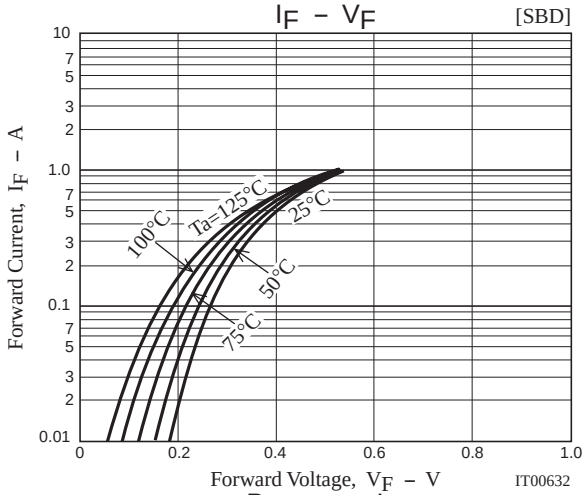

SW Time – ID [MOSFET]
VDD= –15V
VGS= –10V
Switching Time, SW Time – ns
Drain Current, ID – A
IT03218
td(off)
tf
td(on)
tr

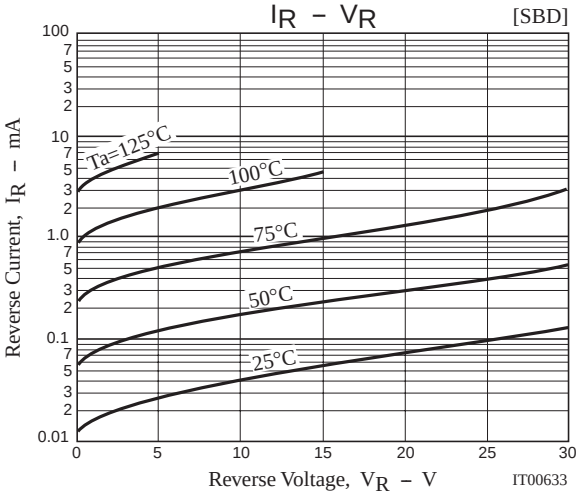

Ciss, Coss, Crss – VDS [MOSFET]
f=1MHz
Ciss, Coss, Crss – pF
Drain-to-Source Voltage, VDS – V
IT03219
Ciss
Coss
Crss

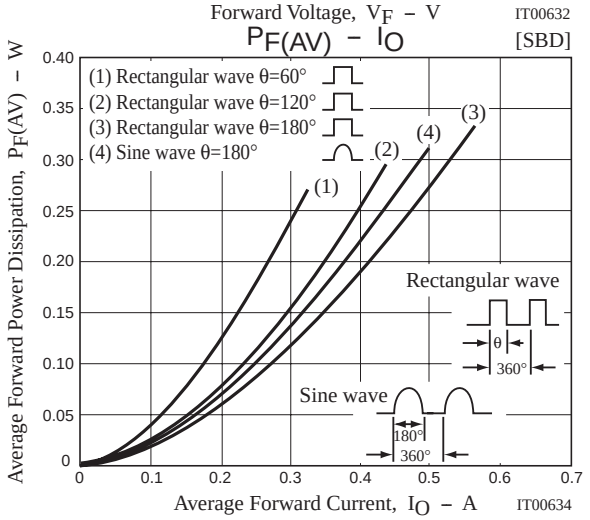

VGS – Qg
[MOSFET]
VDS= –10V
ID= –2A
Gate-to-Source Voltage, VGS – V
Total Gate Charge, Qg – nC
IT03220

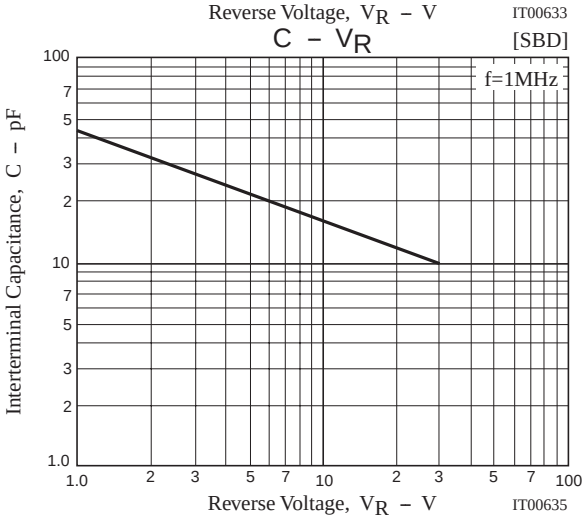

A S O
[MOSFET]
IDP= –8A
ID= –2A
<10µs
100µs
1ms
10ms
100ms
DC operation
Operation in this
area is limited by RDS(on).
Ta=25°C
Single pulse
Mounted on a ceramic board(600mm2X0.8mm) 1unit
Drain Current, ID – A
Drain-to-Source Voltage, VDS – V
IT03221


PD – Ta
[MOSFET]
Mounted on a ceramic board(600mm2X0.8mm) 1unit
Allowable Power Dissipation, PD – W
Ambient Temperature, Ta – °C
IT03222


IF – VF
[SBD]
Ta=125°C
100°C
75°C
50°C
25°C
Forward Current, IF – A
Forward Voltage, VF – V
IT00632


IR – VR
[SBD]
Ta=125°C
100°C
75°C
50°C
25°C
Reverse Current, IR – mA
Reverse Voltage, VR – V
IT00633


PF(AV) – IO
[SBD]
(1) Rectangular wave θ=60°
(2) Rectangular wave θ=120°
(3) Rectangular wave θ=180°
(4) Sine wave θ=180°
Rectangular wave
θ
360°
Sine wave
180°
360°
Average Forward Power Dissipation, PF(AV) – W
Average Forward Current, IO – A
IT00634


C – VR
[SBD]
f=1MHz
Interterminal Capacitance, C – pF
Reverse Voltage, VR – V
IT00635