Ordering number : ENN7267

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

CPH5809

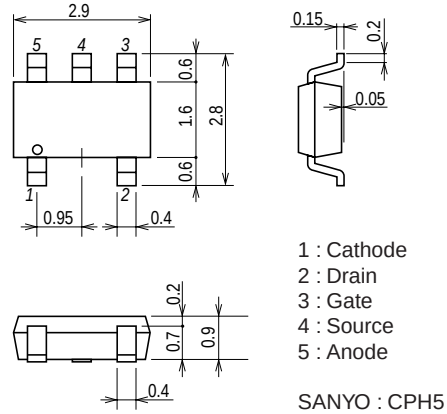
DC / DC Converter Applications

Features

- The CPH5809 composite device consists of following two devices to facilitate high-density mounting. One is an N-channel MOSFET that features low ON-resistance, ultrahigh-speed switching, and low driving voltage. The other is a schottky barrier diode that features short reverse recovery time and low forward voltage.
- Each device incorporated in the CPH5809 is equivalent to the MCH3411 and to the SBS005, respectively.

Package Dimensions

unit : mm
2171



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}		±10	V
Drain Current (DC)	I_D		3	A
Drain Current (Pulse)	I_{DP}	PW≤10μs, duty cycle≤1%	12	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		1	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 : QK

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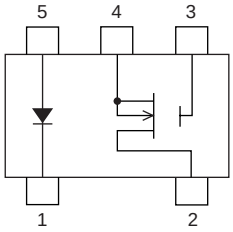
TOKYO OFFICE Tokyo Bldg., 1-10, 1 Chome, Ueno, Taito-ku, TOKYO, 110-8534 JAPAN

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_{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=1.5A	3.5	5.0		S
Static Drain-to-Source On-State Resistance	R_{DS}(on)1	I_D=1.5A, V_{GS}=4V		69	90	mΩ
	R_{DS}(on)2	I_D=1A, V_{GS}=2.5V		84	118	mΩ
Input Capacitance	Ciss	V_{DS}=10V, f=1MHz		270		pF
Output Capacitance	Coss	V_{DS}=10V, f=1MHz		38		pF
Reverse Transfer Capacitance	Crss	V_{DS}=10V, f=1MHz		23		pF
Turn-ON Delay Time	t_d(on)	See specified Test Circuit.		10		ns
Rise Time	t_r	See specified Test Circuit.		30		ns
Turn-OFF Delay Time	t_d(off)	See specified Test Circuit.		42		ns
Fall Time	t_f	See specified Test Circuit.		52		ns
Total Gate Charge	Qg	V_{DS}=10V, V_{GS}=4V, I_D=3.0A		3.7		nC
Gate-to-Source Charge	Qgs	V_{DS}=10V, V_{GS}=4V, I_D=3.0A		0.7		nC
Gate-to-Drain “Miller” Charge	Qgd	V_{DS}=10V, V_{GS}=4V, I_D=3.0A		0.5		nC
Diode Forward Voltage	V_{SD}	I_S=3.0A, V_{GS}=0		0.85	1.2	V
[SBD]						
Reverse Voltage	V_R	I_R=1mA	30			V
Forward Voltage	V_F1	I_F=0.5A		0.35	0.4	V
	V_F2	I_F=1A		0.42	0.47	V
Reverse Current	I_R	V_R=15V			500	μA
Interterminal Capacitance	C	V_R=10V, f=1MHz cycle		35		pF
Reverse Recovery Time	t_{rr}	I_F=I_R=100mA, see specified Test Circuit.			15	ns
Thermal Resistance	Rthj-a	Mounted on a ceramic board (600mm²×0.8mm)		110		°C / W

Electrical Connection

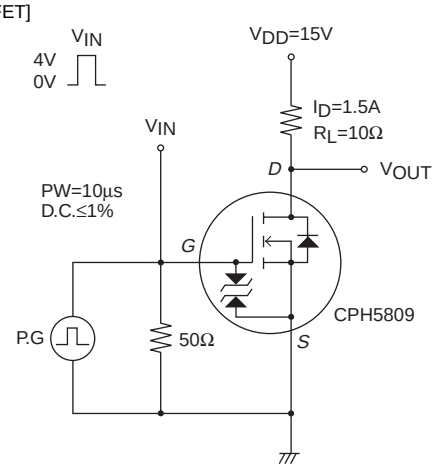


1 : Cathode
2 : Drain
3 : Gate
4 : Source
5 : Anode

(Top view)

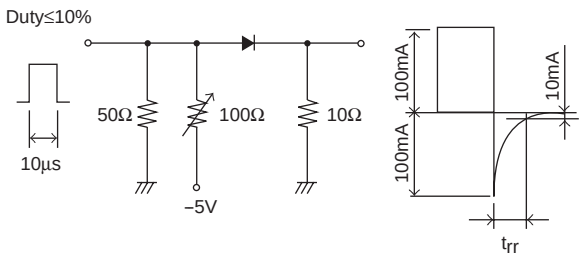
Switching Time Test Circuit

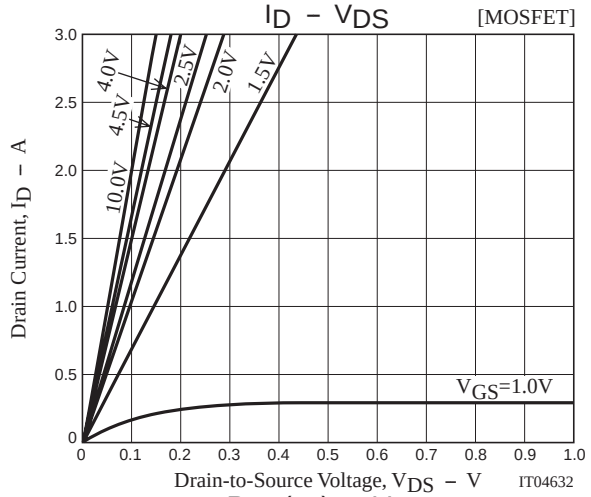
[MOSFET]

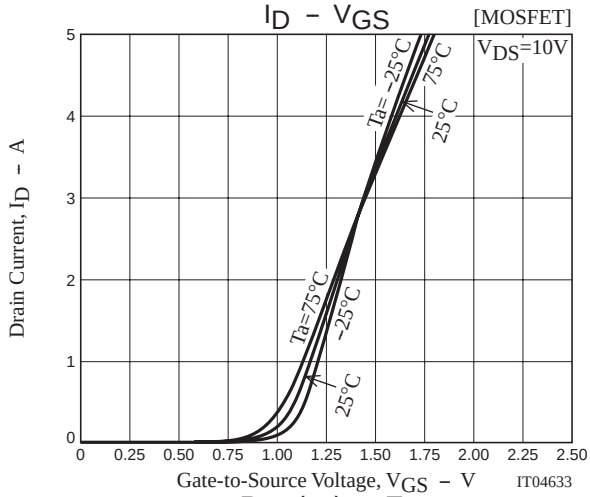


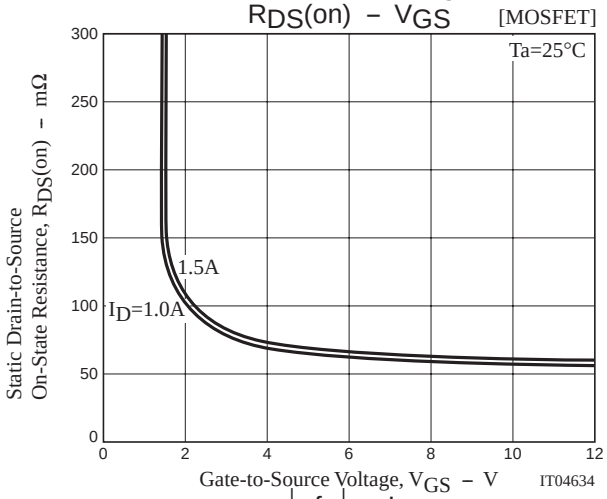
t_{rr} Test Circuit

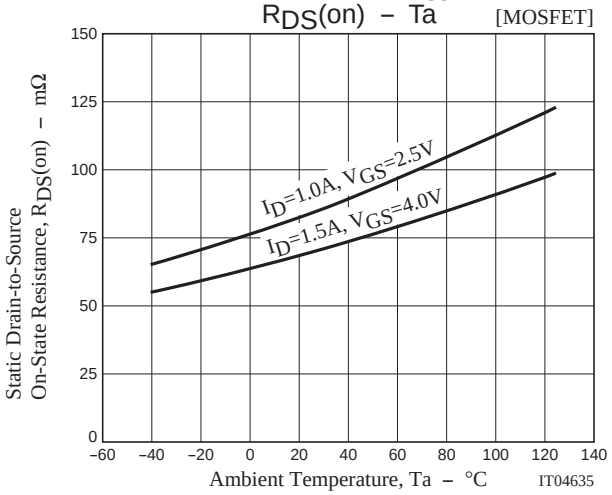
[SBD]

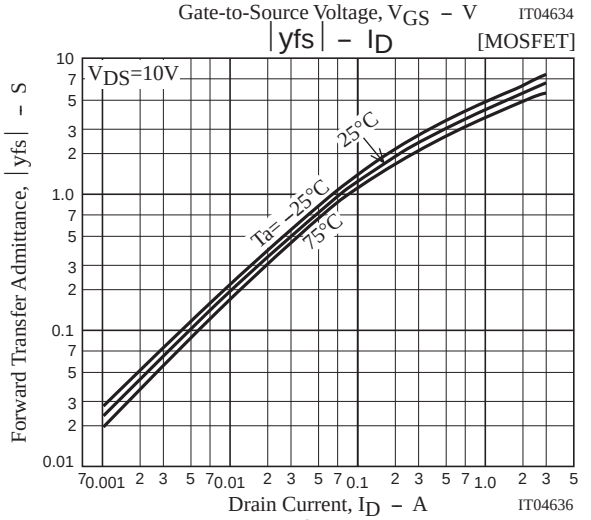


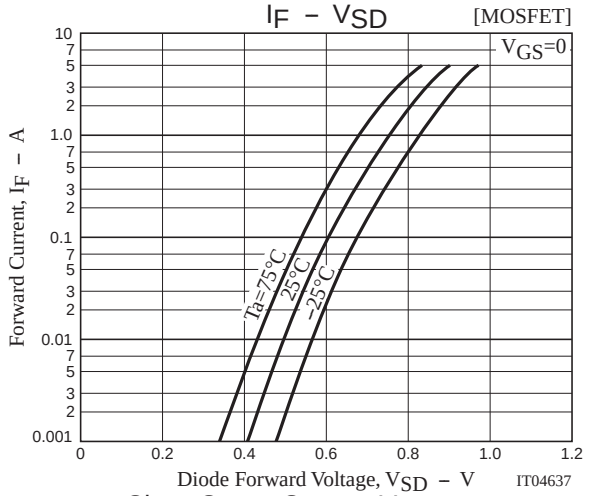

I_D – V_{DS} [MOSFET]
Drain Current, I_D – A
Drain-to-Source Voltage, V_{DS} – V
IT04632
4.0V
4.5V
2.5V
2.0V
1.5V
10.0V
V_{GS}=1.0V

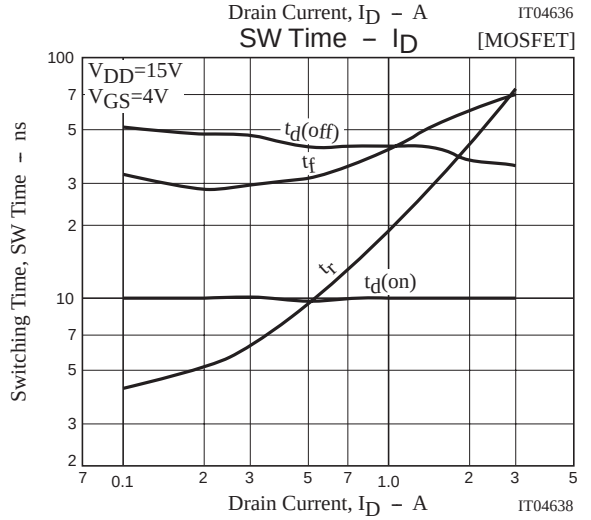

I_D – V_{GS} [MOSFET]
Drain Current, I_D – A
Gate-to-Source Voltage, V_{GS} – V
IT04633
V_{DS}=10V
Ta= –25°C
75°C
25°C
Ta=75°C
–25°C
25°C

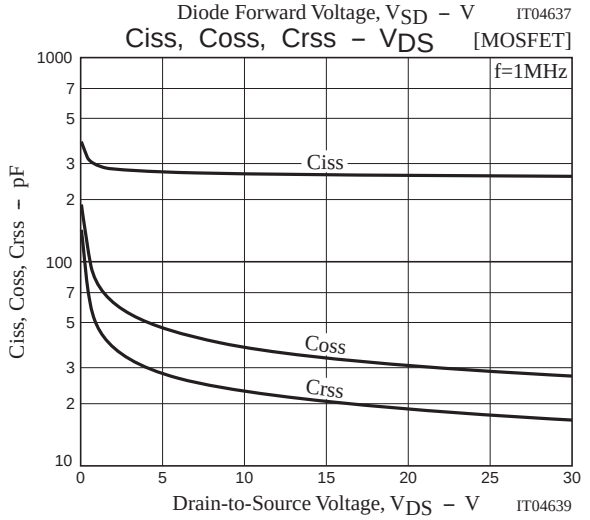

$R_{DS(on)}$ – V_{GS} [MOSFET]
Static Drain-to-Source On-State Resistance, $R_{DS(on)}$ – mΩ
Gate-to-Source Voltage, V_{GS} – V
IT04634
Ta=25°C
1.5A
I_D=1.0A

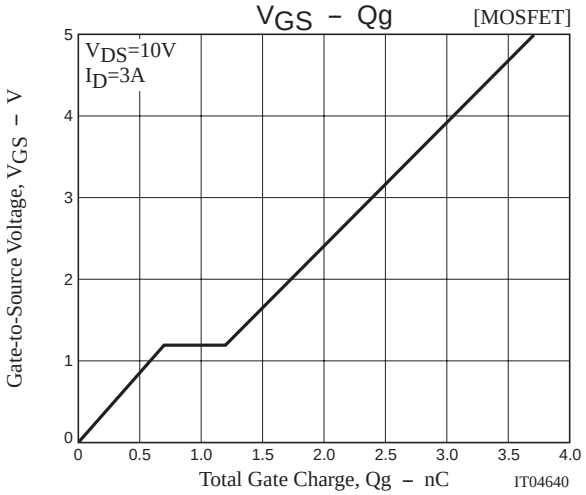

$R_{DS(on)}$ – Ta [MOSFET]
Static Drain-to-Source On-State Resistance, $R_{DS(on)}$ – mΩ
Ambient Temperature, Ta – °C
IT04635
I_D=1.0A, V_{GS}=2.5V
I_D=1.5A, V_{GS}=4.0V

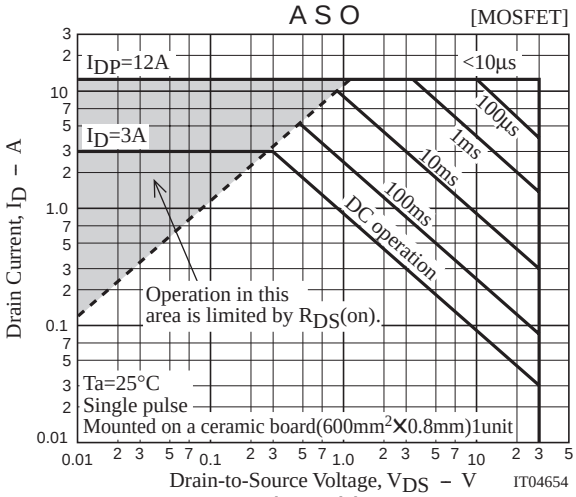

|yfs| – I_D [MOSFET]
Forward Transfer Admittance, |yfs| – S
Drain Current, I_D – A
IT04636
V_{DS}=10V
25°C
Ta= –25°C
75°C

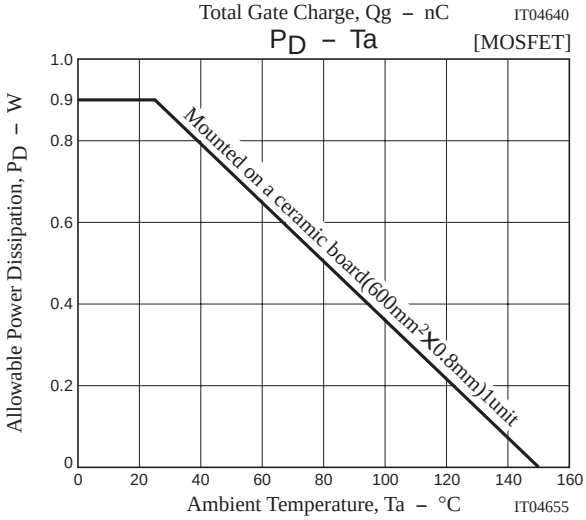

I_F – V_{SD} [MOSFET]
Forward Current, I_F – A
Diode Forward Voltage, V_{SD} – V
IT04637
V_{GS}=0
Ta=75°C
25°C
–25°C

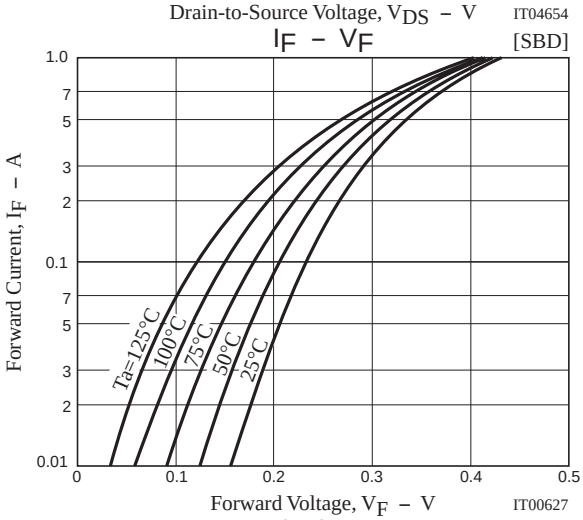

SW Time – I_D [MOSFET]
Switching Time, SW Time – ns
Drain Current, I_D – A
IT04638
V_{DD}=15V
V_{GS}=4V
$t_{d(off)}$
t_f
t_r
$t_{d(on)}$

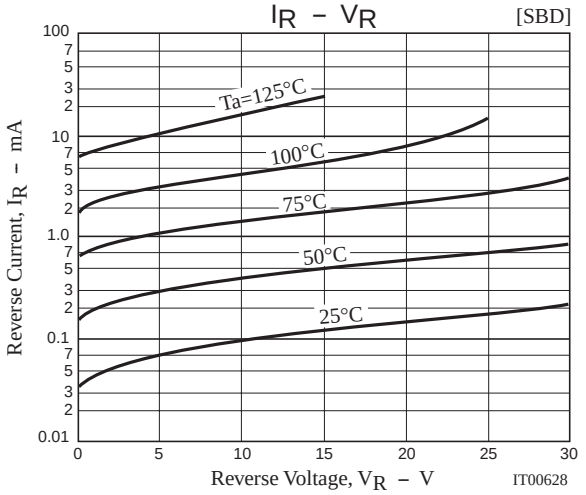

Ciss, Coss, Crss – V_{DS} [MOSFET]
Ciss, Coss, Crss – pF
Drain-to-Source Voltage, V_{DS} – V
IT04639
f=1MHz
Ciss
Coss
Crss

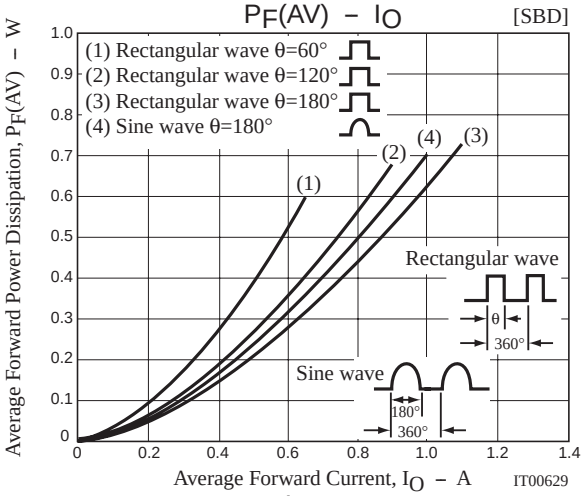

VGS – Qg
[MOSFET]
VDS=10V
ID=3A
Gate-to-Source Voltage, VGS – V
Total Gate Charge, Qg – nC
IT04640

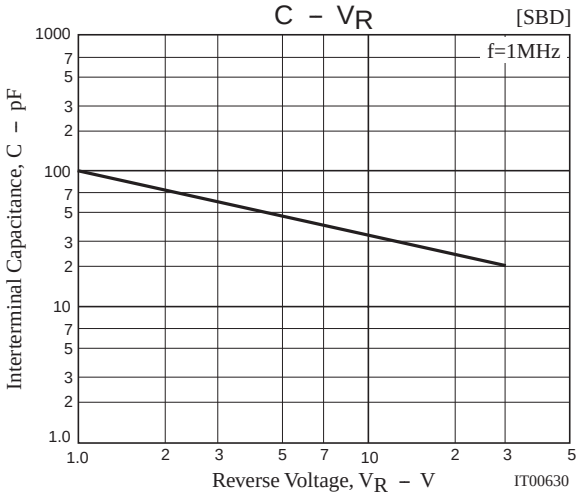

A S O
[MOSFET]
IDP=12A
<10µs
100µs
1ms
10ms
100ms
DC operation
ID=3A
Operation in this area is limited by RDS(on).
Ta=25°C
Single pulse
Mounted on a ceramic board(600mm2×0.8mm)1unit
Drain Current, ID – A
Drain-to-Source Voltage, VDS – V
IT04654

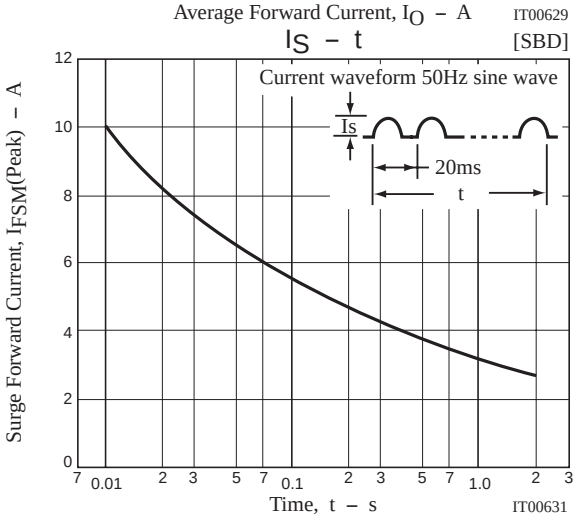

PD – Ta
[MOSFET]
Mounted on a ceramic board(600mm2×0.8mm)1unit
Allowable Power Dissipation, PD – W
Ambient Temperature, Ta – °C
IT04655


IF – VF
[SBD]
Ta=125°C
100°C
75°C
50°C
25°C
Forward Current, IF – A
Forward Voltage, VF – V
IT00627


IR – VR
[SBD]
Ta=125°C
100°C
75°C
50°C
25°C
Reverse Current, IR – mA
Reverse Voltage, VR – V
IT00628


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
IT00629


C – VR
[SBD]
f=1MHz
Interterminal Capacitance, C – pF
Reverse Voltage, VR – V
IT00630


IS – t
[SBD]
Current waveform 50Hz sine wave
Is
20ms
t
Surge Forward Current, IFSM(Peak) – A
Time, t – s
IT00631

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