Ordering number : ENN7381

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

CPH5815

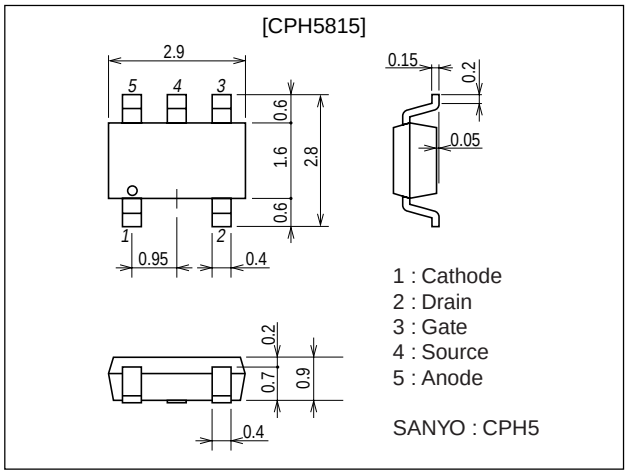
DC / DC Converter Applications

Features

- Composite type with a P-Channel Sillicon MOSFET (MCH3317) and a Schottky Barrier Diode (SBS007M) contained in one package facilitating high-density mounting.
- [MOS]
  1) Low ON-resistance.
  2) Ultrahigh-speed switching.
  3) 1.8V drive.
- [SBD]
  1) Short reverse recovery time.
  2) Low forward voltage.

Package Dimensions

unit : mm
2171



Specifications

Absolute Maximum Ratings at Ta=25°C

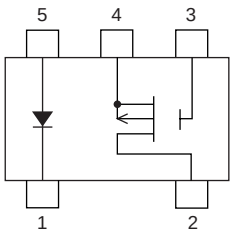
Parameter	Symbol	Conditions	Ratings	Unit
[MOSFET]				
Drain-to-Source Voltage	V_{DSS}		−12	V
Gate-to-Source Voltage	V_{GSS}		±10	V
Drain Current (DC)	I_D		−1.5	A
Drain Current (Pulse)	I_{DP}	PW≤10μs, duty cycle≤1%	−6.0	A
Allowable Power Dissipation	P_D	Mounted on a ceramic board (600mm²×0.8mm) 1unit	0.8	W
Channel Temperature	Tch		−150	°C
Storage Temperature	Tstg		−55 to +125	°C
[SBD]				
Repetitive Peak Reverse Voltage	V_{RRM}		15	V
Nonrepetitive Peak Reverse Surge Voltage	V_{RSM}		15	V
Average Output Current	I_O		0.5	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

Marking : QR

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	–12			V
Zero-Gate Voltage Drain Current	I_{DSS}	V_{DS}=–12V, V_{GS}=0			–10	μA
Gate-to-Source Leakage Current	I_{GSS}	V_{GS}=±8.0V, V_{DS}=0			±10	μA
Cutoff Voltage	V_{GS}(off)	V_{DS}=–6V, I_D=–1mA	–0.3		–1.0	V
Forward Transfer Admittance	|yfs|	V_{DS}=–6V, I_D=–0.8A	1.3	1.8		S
Static Drain-to-Source On-State Resistance	R_{DS}(on)1	I_D=–0.8A, V_{GS}=–4.5V		220	290	mΩ
	R_{DS}(on)2	I_D=–0.4A, V_{GS}=–2.5V		320	450	mΩ
	R_{DS}(on)3	I_D=–0.1A, V_{GS}=–1.8V		430	650	mΩ
Input Capacitance	Ciss	V_{DS}=–6V, f=1MHz		160		pF
Output Capacitance	Coss	V_{DS}=–6V, f=1MHz		45		pF
Reverse Transfer Capacitance	Crss	V_{DS}=–6V, f=1MHz		35		pF
Turn-ON Delay Time	t_d(on)	See specified Test Circuit.		11		ns
Rise Time	t_r	See specified Test Circuit.		45		ns
Turn-OFF Delay Time	t_d(off)	See specified Test Circuit.		29		ns
Fall Time	t_f	See specified Test Circuit.		30		ns
Total Gate Charge	Qg	V_{DS}=–6V, V_{GS}=–4.5V, I_D=–1.5A		2.6		nC
Gate-to-Source Charge	Qgs	V_{DS}=–6V, V_{GS}=–4.5V, I_D=–1.5A		0.25		nC
Gate-to-Drain “Miller” Charge	Qgd	V_{DS}=–6V, V_{GS}=–4.5V, I_D=–1.5A		0.65		nC
Diode Forward Voltage	V_{SD}	I_S=–1.5A, V_{GS}=0		–0.92	–1.5	V
[SBD]						
Reverse Voltage	V_R	I_R=0.5mA	15			V
Forward Voltage	V_F1	I_F=0.3A		0.35	0.41	V
	V_F2	I_F=0.5A		0.4	0.46	V
Reverse Current	I_R	V_R=6V			200	μA
Interterminal Capacitance	C	V_R=10V, f=1MHz cycle		20		pF
Reverse Recovery Time	t_{rr}	I_F=I_R=100mA, see specified Test Circuit.			10	ns

Electrical Connection

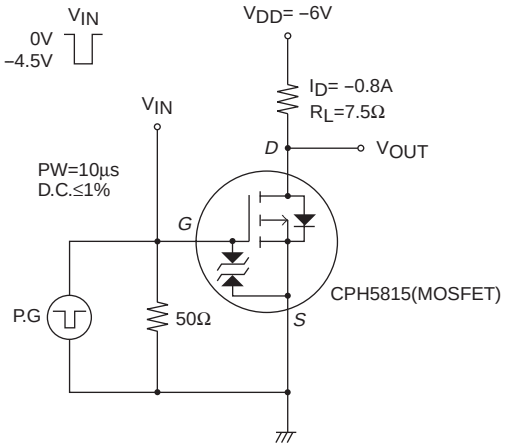


1 : Cathode
2 : Drain
3 : Gate
4 : Source
5 : Anode

(Top view)

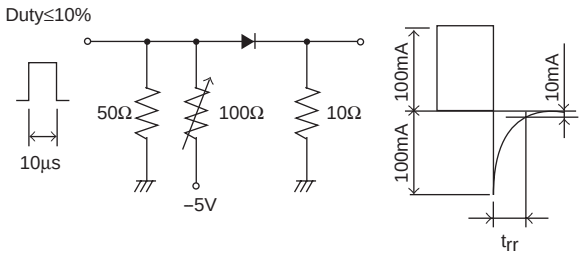
Switching Time Test Circuit

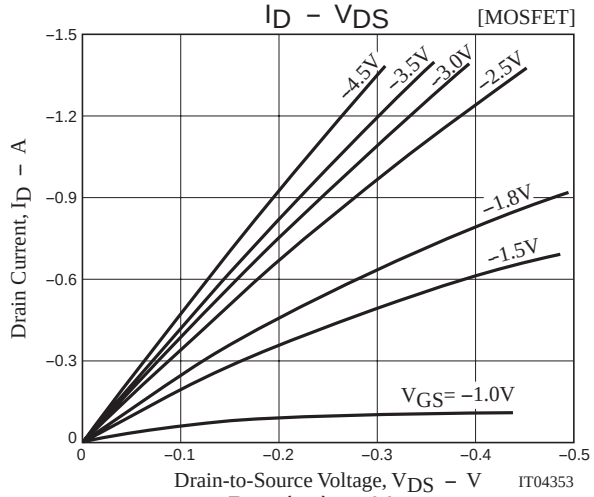
[MOSFET]

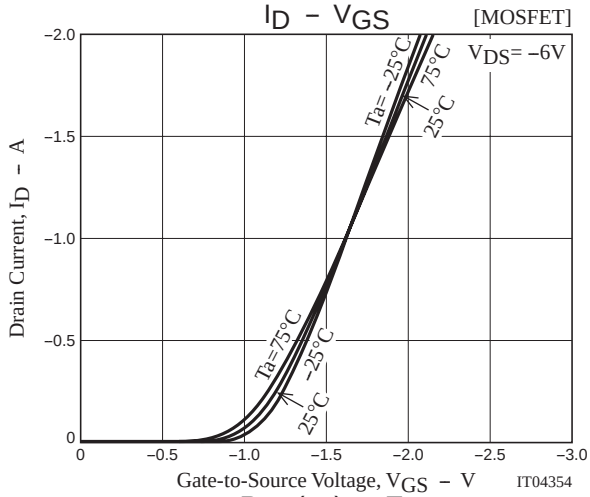


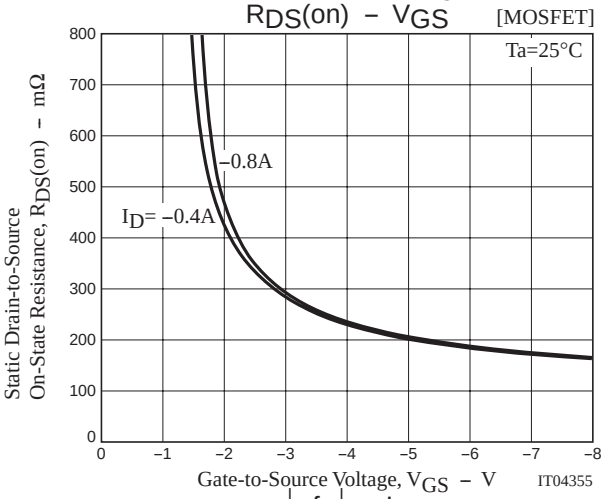
t_{rr} Test Circuit

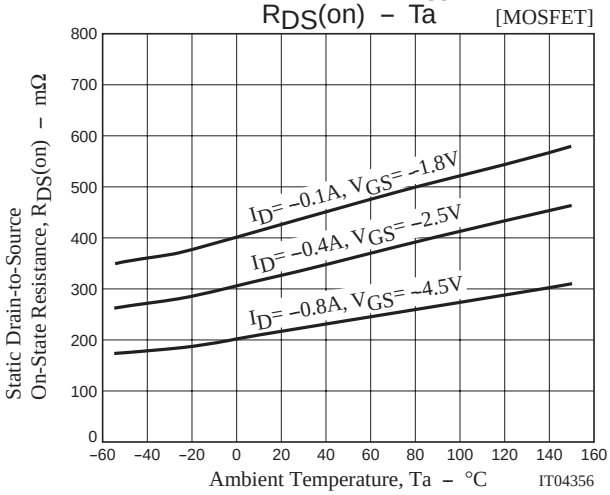
[SBD]

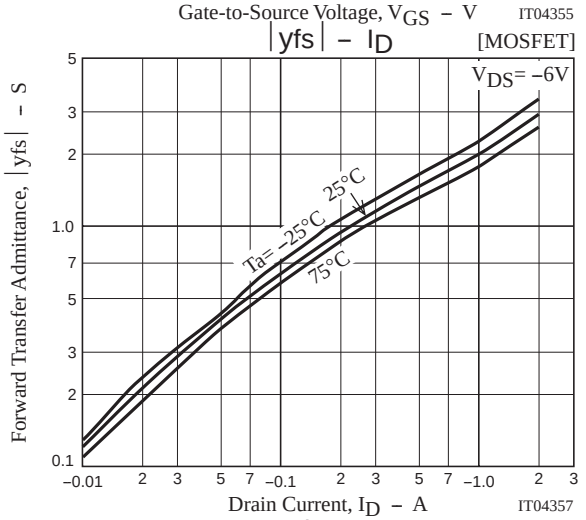


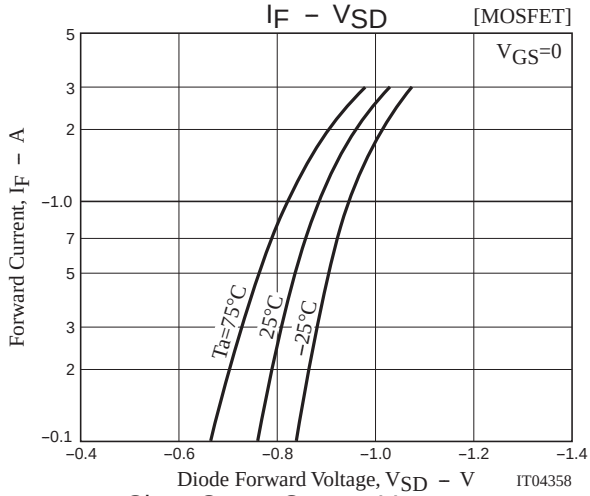

ID – VDS [MOSFET]
Drain Current, ID – A
Drain-to-Source Voltage, VDS – V
IT04353
–4.5V
–3.5V
–3.0V
–2.5V
–1.8V
–1.5V
VGS= –1.0V

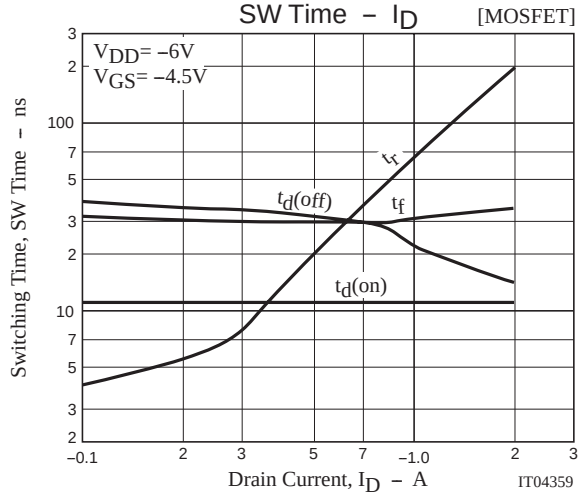

ID – VGS [MOSFET]
VDS= –6V
Drain Current, ID – A
Gate-to-Source Voltage, VGS – V
IT04354
Ta= –25°C
75°C
25°C
Ta=75°C
–25°C
25°C

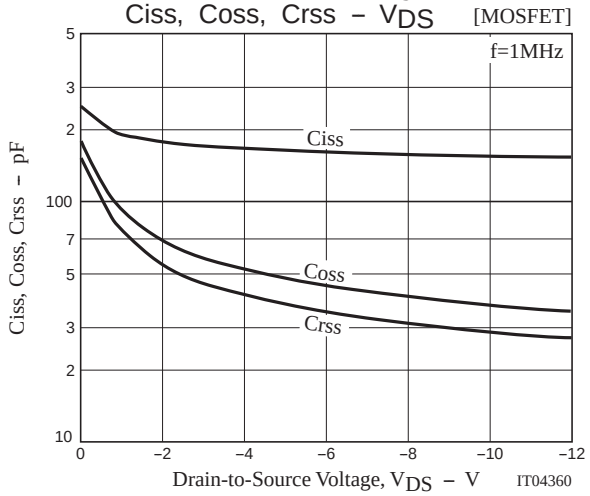

RDS(on) – VGS [MOSFET]
Ta=25°C
Static Drain-to-Source On-State Resistance, RDS(on) – mΩ
Gate-to-Source Voltage, VGS – V
IT04355
–0.8A
ID= –0.4A

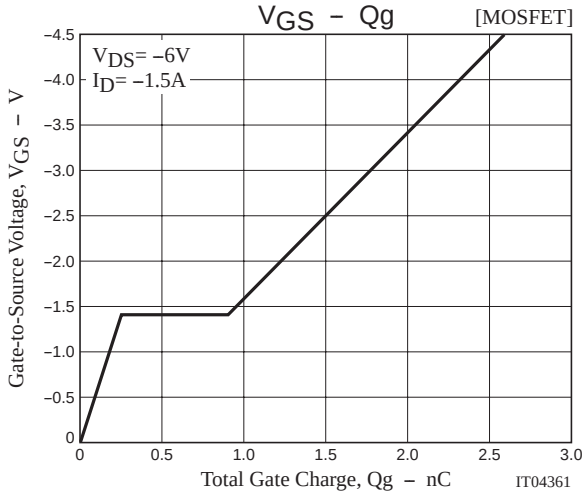

RDS(on) – Ta [MOSFET]
Static Drain-to-Source On-State Resistance, RDS(on) – mΩ
Ambient Temperature, Ta – °C
IT04356
ID= –0.1A, VGS= –1.8V
ID= –0.4A, VGS= –2.5V
ID= –0.8A, VGS= –4.5V

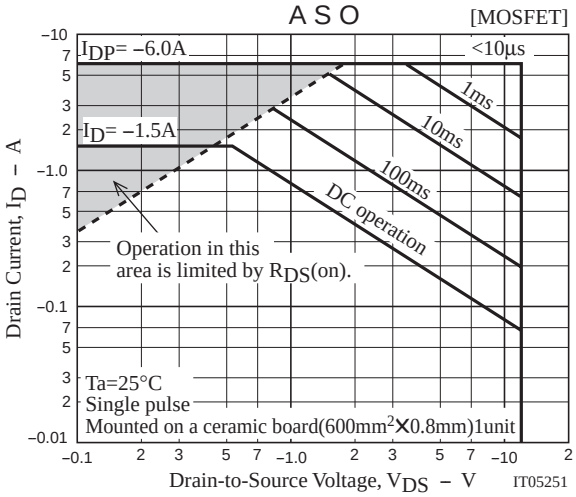

|yfs| – ID [MOSFET]
VDS= –6V
Forward Transfer Admittance, |yfs| – S
Drain Current, ID – A
IT04357
Ta= –25°C
25°C
75°C

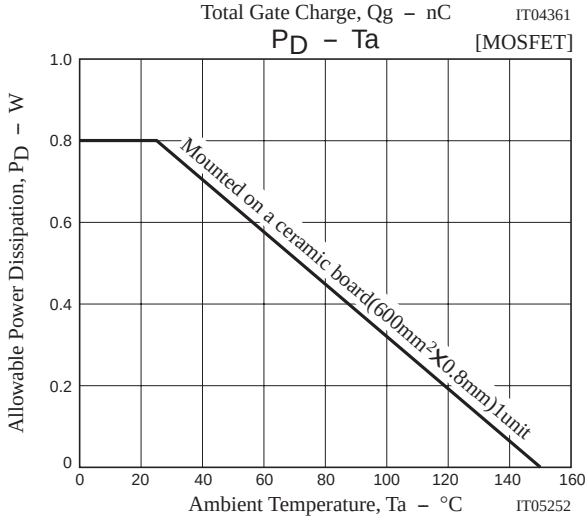

IF – VSD [MOSFET]
VGS=0
Forward Current, IF – A
Diode Forward Voltage, VSD – V
IT04358
Ta=75°C
25°C
–25°C

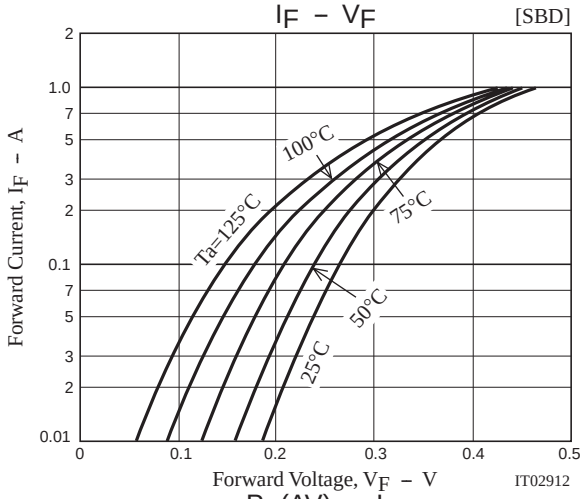

SW Time – ID [MOSFET]
VDD= –6V
VGS= –4.5V
Switching Time, SW Time – ns
Drain Current, ID – A
IT04359
tr
td(off)
tf
td(on)

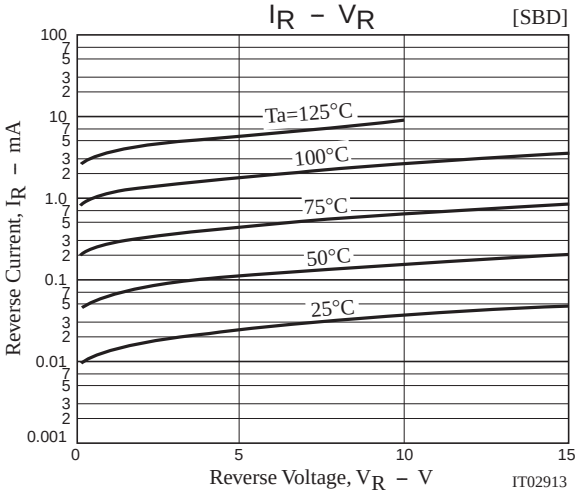

Ciss, Coss, Crss – VDS [MOSFET]
f=1MHz
Ciss, Coss, Crss – pF
Drain-to-Source Voltage, VDS – V
IT04360
Ciss
Coss
Crss

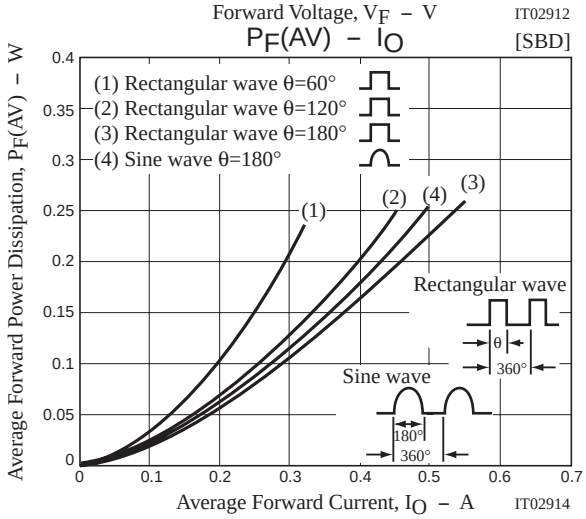

VGS – Qg
[MOSFET]
VDS= –6V
ID= –1.5A
Gate-to-Source Voltage, VGS – V
Total Gate Charge, Qg – nC
IT04361

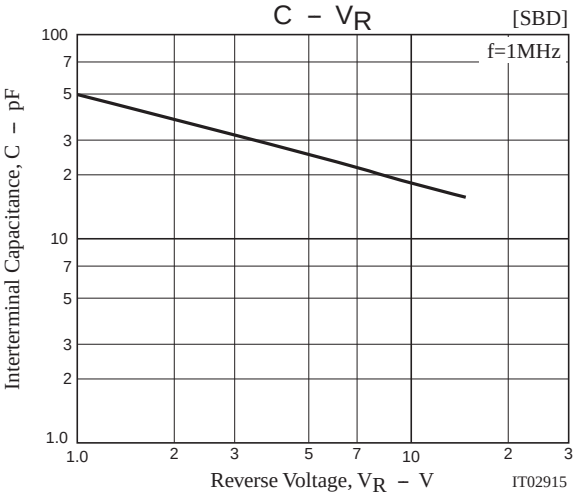

A S O
[MOSFET]
IDP= –6.0A
<10μs
1ms
10ms
100ms
DC operation
ID= –1.5A
Operation in this
area is limited by RDS(on).
Ta=25°C
Single pulse
Mounted on a ceramic board(600mm2×0.8mm)1unit
Drain Current, ID – A
Drain-to-Source Voltage, VDS – V
IT05251

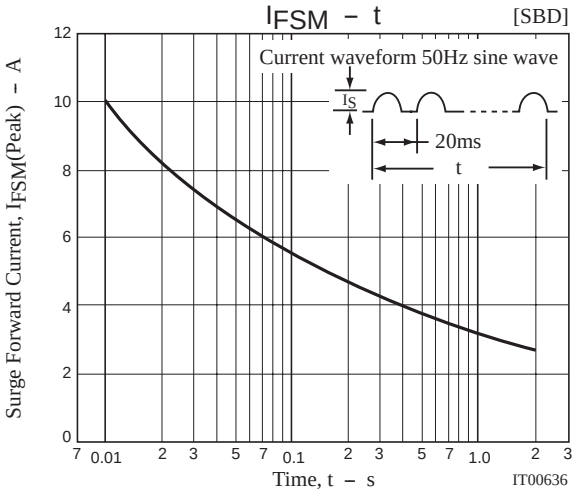

PD – Ta
[MOSFET]
Mounted on a ceramic board(600mm2×0.8mm)1unit
Allowable Power Dissipation, PD – W
Ambient Temperature, Ta – °C
IT05252


IF – VF
[SBD]
100°C
Ta=125°C
75°C
50°C
25°C
Forward Current, IF – A
Forward Voltage, VF – V
IT02912


IR – VR
[SBD]
Ta=125°C
100°C
75°C
50°C
25°C
Reverse Current, IR – mA
Reverse Voltage, VR – V
IT02913


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
Sine wave
θ
360°
180°
Average Forward Power Dissipation, PF(AV) – W
Average Forward Current, IO – A
IT02914


C – VR
[SBD]
f=1MHz
Interterminal Capacitance, C – pF
Reverse Voltage, VR – V
IT02915



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