MCH5839

Power MOSFET
–20V, 266mΩ, –1.5A, Single P-Channel with Schottky Diode

MCH5839 is a P-Channel Power MOSFET, with Schottky Diode for general-purpose switching device applications.

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Features

- Composite type with a P-Channel silicon MOSFET and a schottky barrier diode contained in one package facilitating high-density mounting
- Pb-Free, Halogen Free and RoHS compliance

[MOSFET]
- Low On-resistance
- ESD Diode-Protected Gate
- 1.8V drive

[SBD]
- Short reverse recovery time
- Low forward voltage

Typical Applications

- DC/DC Converter

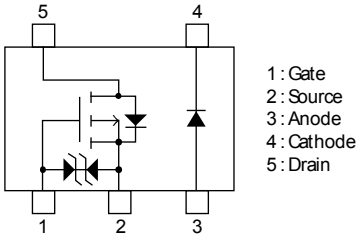
MOSFET

V_{DSS}	R_{DS}(on) Max	I_D Max
–20V	266mΩ@ –4.5V	–1.5A
	413mΩ@ –2.5V	
	645mΩ@ –1.8V	

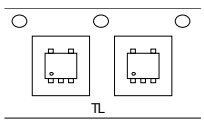
SCHOTTKY DIODE

V_{RRM}	V_F Max	I_{FSM}
15V	0.46V	3A

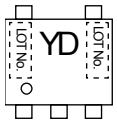
ELECTRICAL CONNECTION
P-Channel



PACKING TYPE : TL



MARKING



ORDERING INFORMATION

See detailed ordering and shipping information on page 6 of this data sheet.

SPECIFICATIONS

ABSOLUTE MAXIMUM RATING at Ta = 25°C (Note 1)

Parameter	Symbol	Value	Unit
[MOSFET]			
Drain to Source Voltage	V_{DSS}	–20	V
Gate to Source Voltage	V_{GSS}	±10	V
Drain Current (DC)	I_D	–1.5	A
Drain Current (Pulse) PW ≤ 10μs, duty cycle ≤ 1%	I_{DP}	–6	A
Power Dissipation When mounted on ceramic substrate (1000mm^2 × 0.8mm) 1unit	P_D	0.8	W
Junction Temperature	Tj	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	1	A
Surge Forward Current 50Hz sine wave, 1cycle	I_{FSM}	3	A
Junction Temperature	Tj	–55 to +125	°C
Storage Temperature	Tstg	–55 to +125	°C

Note 1 : Stresses exceeding those listed in the Maximum Ratings table may damage the device. If any of these limits are exceeded, device functionality should not be assumed, damage may occur and reliability may be affected.

THERMAL RESISTANCE RATINGS

Parameter	Symbol	Value	Unit
Junction to Ambient When mounted on ceramic substrate (1000mm^2 × 0.8mm) 1unit	$R_{\theta JA}$	156.2	°C/W

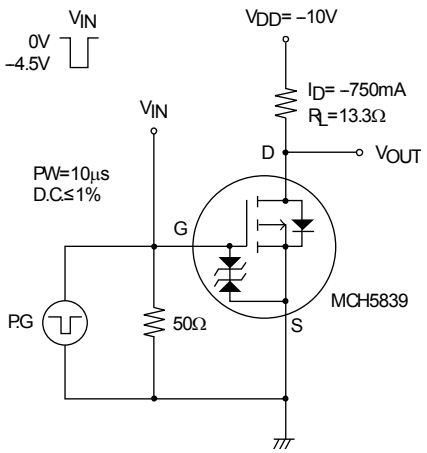
ELECTRICAL CHARACTERISTICS at Ta = 25°C (Note 2)

Parameter	Symbol	Conditions	Value			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
Gate Threshold Voltage	$V_{GS}(th)$	V_{DS}=−10V, I_D=−1mA	−0.4		−1.4	V
Forward Transconductance	g_{FS}	V_{DS}=−10V, I_D=−750mA		1.9		S
Static Drain to Source On-State Resistance	$R_{DS}(on)1$	I_D=−750mA, V_{GS}=−4.5V		205	266	mΩ
	$R_{DS}(on)2$	I_D=−300mA, V_{GS}=−2.5V		295	413	mΩ
	$R_{DS}(on)3$	I_D=−100mA, V_{GS}=−1.8V		430	645	mΩ
Input Capacitance	Ciss	V_{DS}=−10V, f=1MHz		120		pF
Output Capacitance	Coss			26		pF
Reverse Transfer Capacitance	Crss			20		pF
Turn-ON Delay Time	$t_d(on)$	See specified Test Circuit		5.3		ns
Rise Time	t_r			9.7		ns
Turn-OFF Delay Time	$t_d(off)$			16		ns
Fall Time	t_f			14		ns
Total Gate Charge	Qg	V_{DS}=−10V, V_{GS}=−4.5V, I_D=−1.5A		1.7		nC
Gate to Source Charge	Qgs			0.28		nC
Gate to Drain “Miller” Charge	Qgd			0.47		nC
Forward Diode Voltage	V_{SD}	I_S=−1.5A, V_{GS}=0V		−0.89	−1.2	V
[SBD]						
Reverse Voltage	V_R	I_R=0.5mA	15			V
Forward Voltage	V_F	I_F=0.5A		0.4	0.46	V
Reverse Current	I_R	V_R=6V			90	μA
Interterminal Capacitance	C	V_R=10V, f=1MHz		13		pF
Reverse Recovery Time	t_{rr}	I_F=I_R=100mA, See specified Test Circuit			10	ns

Note 2 : Product parametric performance is indicated in the Electrical Characteristics for the listed test conditions, unless otherwise noted. Product performance may not be indicated by the Electrical Characteristics if operated under different conditions.

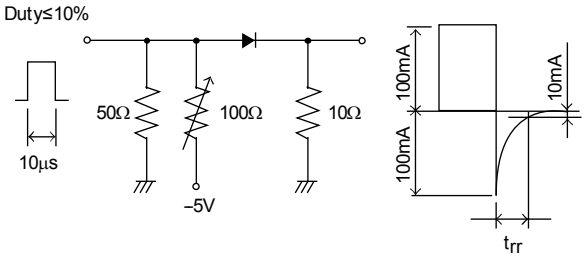
Switching Time Test Circuit

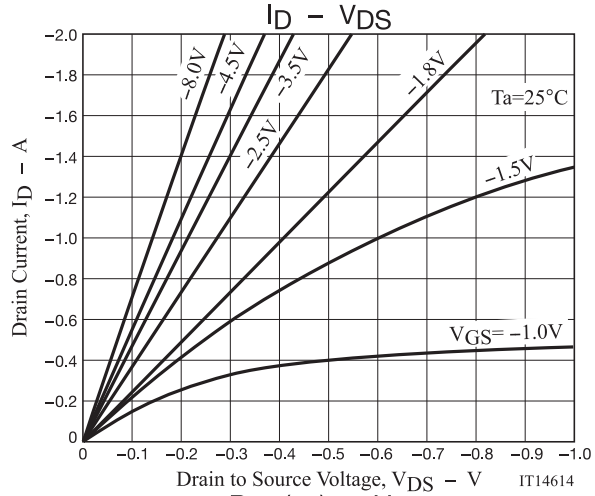
(MOSFET)

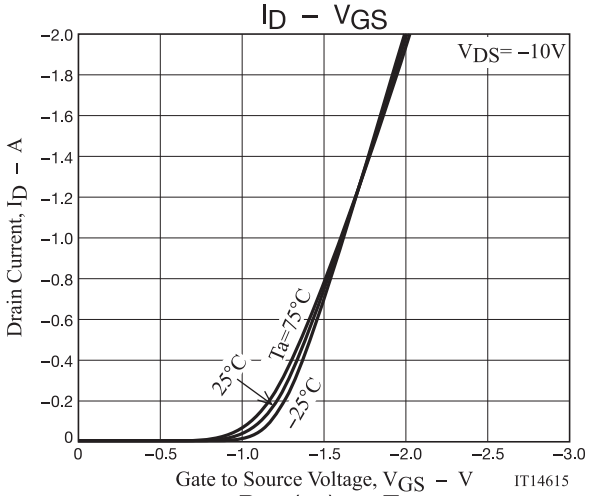


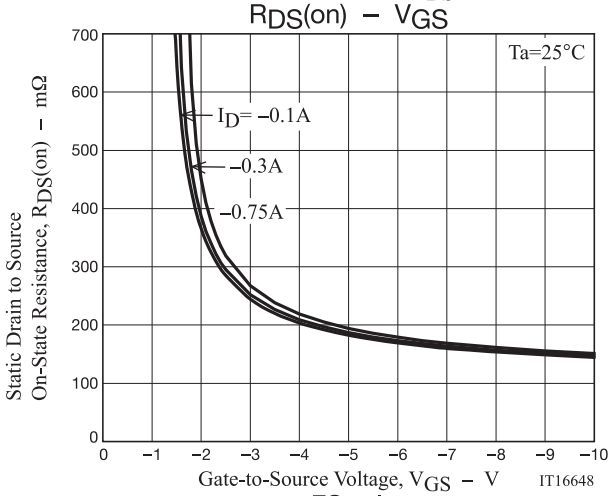
t_{rr} Test Circuit

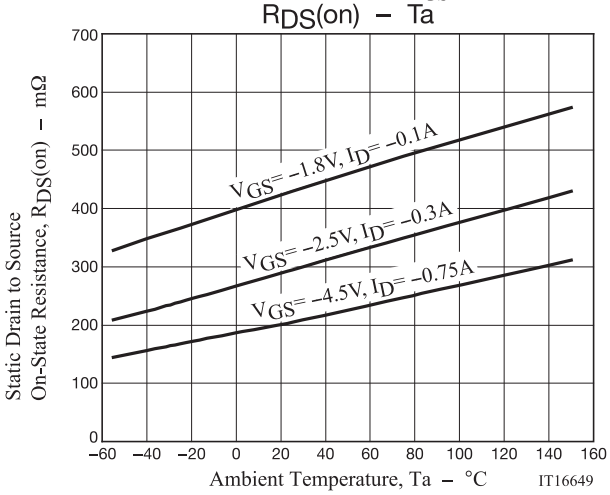
(SBD)

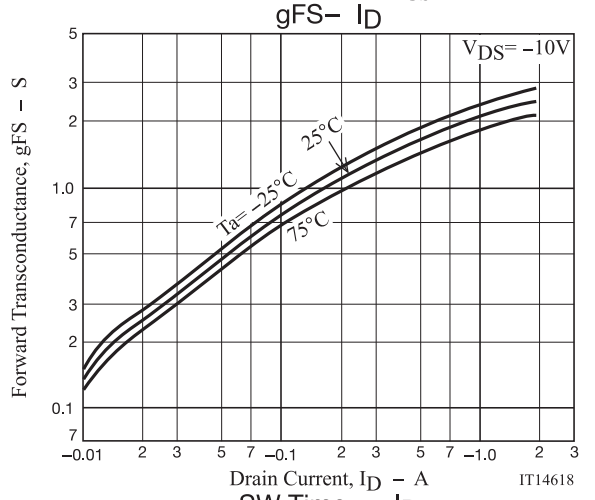


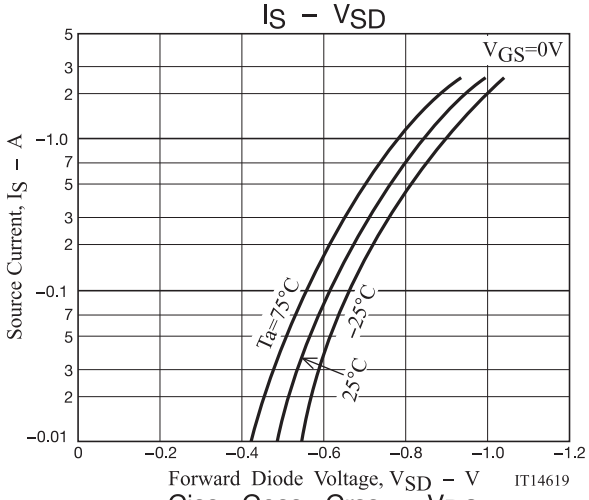

ID – VDS
Drain Current, ID – A
Drain to Source Voltage, VDS – V
Ta=25°C
–8.0V
–4.5V
–3.5V
–2.5V
–1.8V
–1.5V
VGS= –1.0V
IT14614

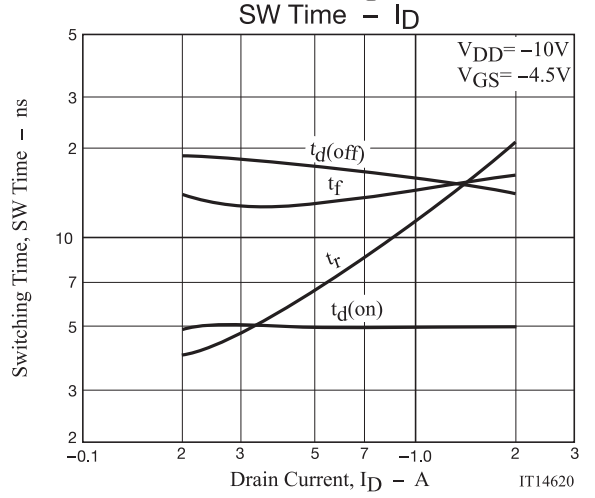

ID – VGS
Drain Current, ID – A
Gate to Source Voltage, VGS – V
VDS= –10V
25°C
Ta=75°C
–25°C
IT14615

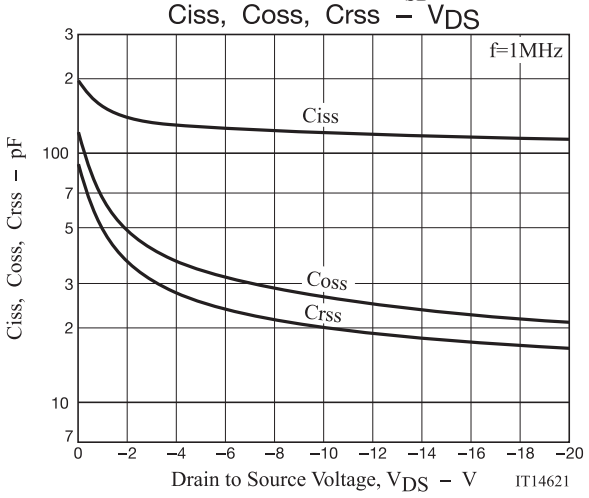

RDS(on) – VGS
Static Drain to Source On-State Resistance, RDS(on) – mΩ
Gate-to-Source Voltage, VGS – V
Ta=25°C
ID= –0.1A
–0.3A
–0.75A
IT16648

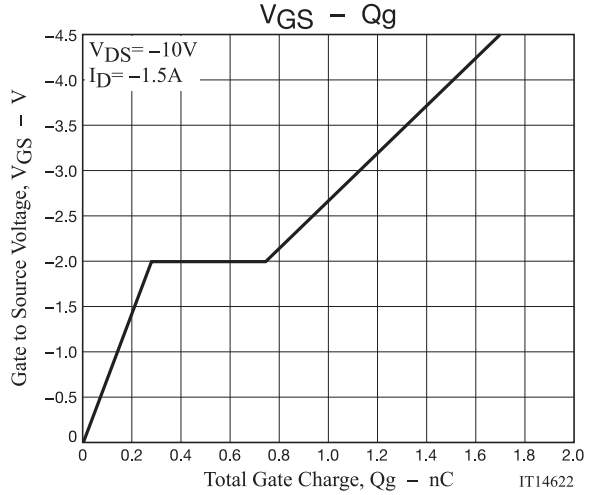

RDS(on) – Ta
Static Drain to Source On-State Resistance, RDS(on) – mΩ
Ambient Temperature, Ta – °C
VGS= –1.8V, ID= –0.1A
VGS= –2.5V, ID= –0.3A
VGS= –4.5V, ID= –0.75A
IT16649

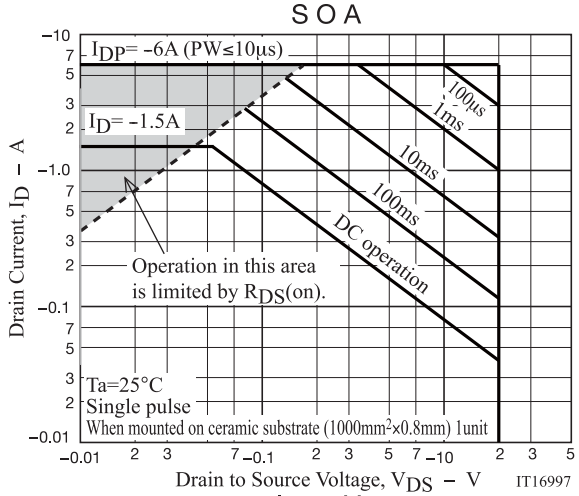

gFS– ID
Forward Transconductance, gFS – S
Drain Current, ID – A
VDS= –10V
25°C
Ta= –25°C
75°C
IT14618

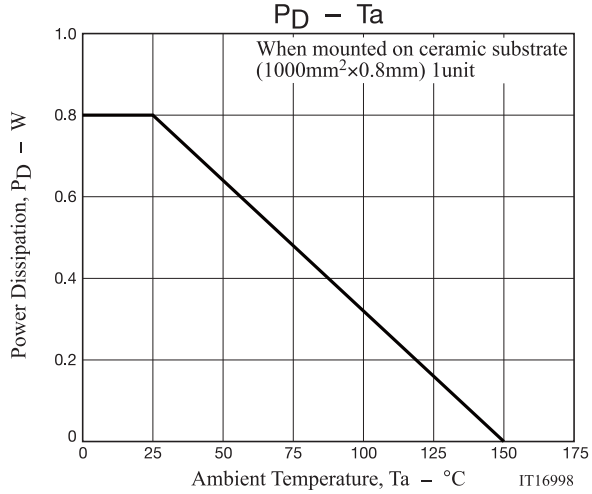

IS – VSD
Source Current, IS – A
Forward Diode Voltage, VSD – V
VGS=0V
Ta=75°C
–25°C
25°C
IT14619

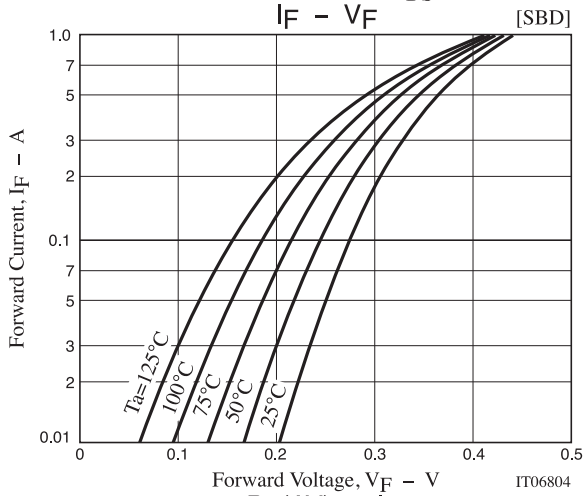

SW Time – ID
Switching Time, SW Time – ns
Drain Current, ID – A
VDD= –10V
VGS= –4.5V
td(off)
tf
tr
td(on)
IT14620

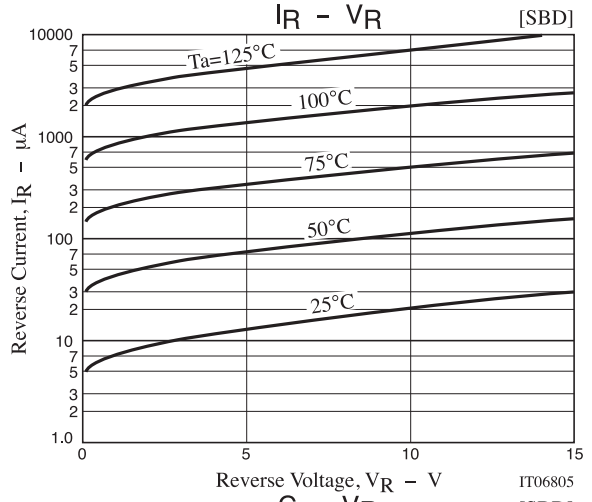

Ciss, Coss, Crss – VDS
Ciss, Coss, Crss – pF
Drain to Source Voltage, VDS – V
f=1MHz
Ciss
Coss
Crss
IT14621

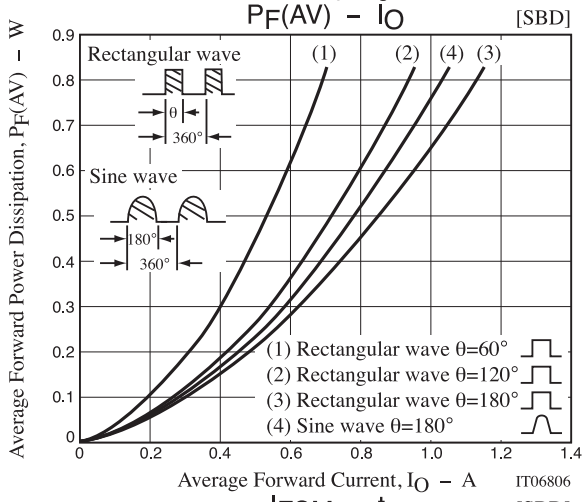

VGS – Qg
VDS= –10V
ID= –1.5A
Gate to Source Voltage, VGS – V
Total Gate Charge, Qg – nC
IT14622

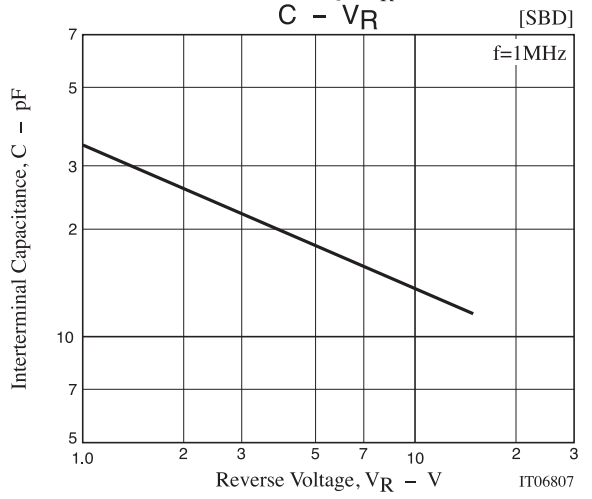

S O A
IDP= –6A (PW≤10μs)
ID= –1.5A
100μs
1ms
10ms
100ms
DC operation
Operation in this area
is limited by RDS(on).
Ta=25°C
Single pulse
When mounted on ceramic substrate (1000mm2×0.8mm) 1unit
Drain Current, ID – A
Drain to Source Voltage, VDS – V
IT16997

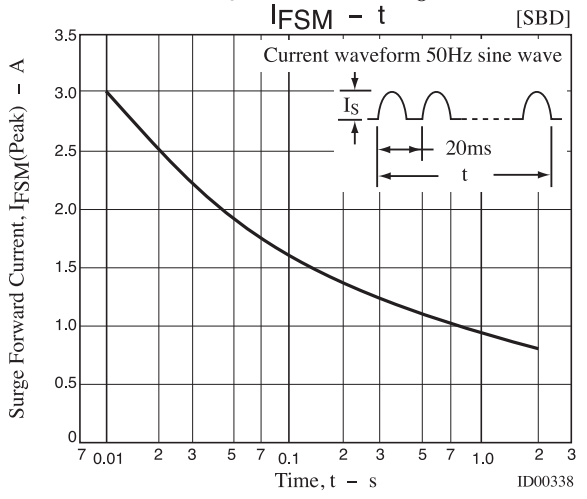

PD – Ta
When mounted on ceramic substrate
(1000mm2×0.8mm) 1unit
Power Dissipation, PD – W
Ambient Temperature, Ta – °C
IT16998

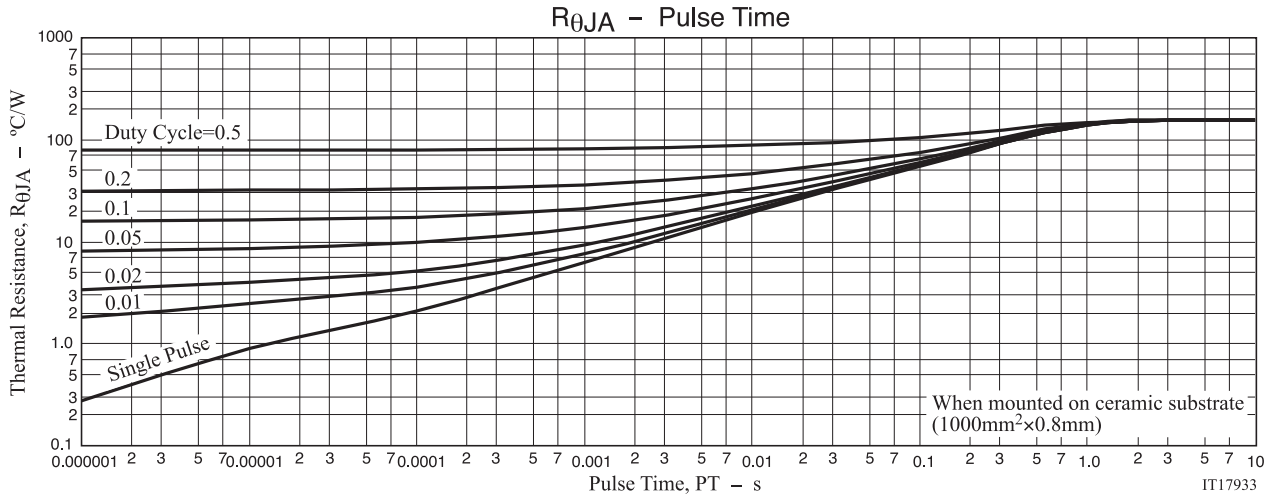

IF – VF
[SBD]
Ta=125°C
100°C
75°C
50°C
25°C
Forward Current, IF – A
Forward Voltage, VF – V
IT06804


IR – VR
[SBD]
Ta=125°C
100°C
75°C
50°C
25°C
Reverse Current, IR – μA
Reverse Voltage, VR – V
IT06805


PF(AV) – IO
[SBD]
Rectangular wave
θ
360°
Sine wave
180°
360°
(1)
(2)
(4)
(3)
(1) Rectangular wave θ=60°
(2) Rectangular wave θ=120°
(3) Rectangular wave θ=180°
(4) Sine wave θ=180°
Average Forward Power Dissipation, PF(AV) – W
Average Forward Current, IO – A
IT06806


C – VR
[SBD]
f=1MHz
Interterminal Capacitance, C – pF
Reverse Voltage, VR – V
IT06807

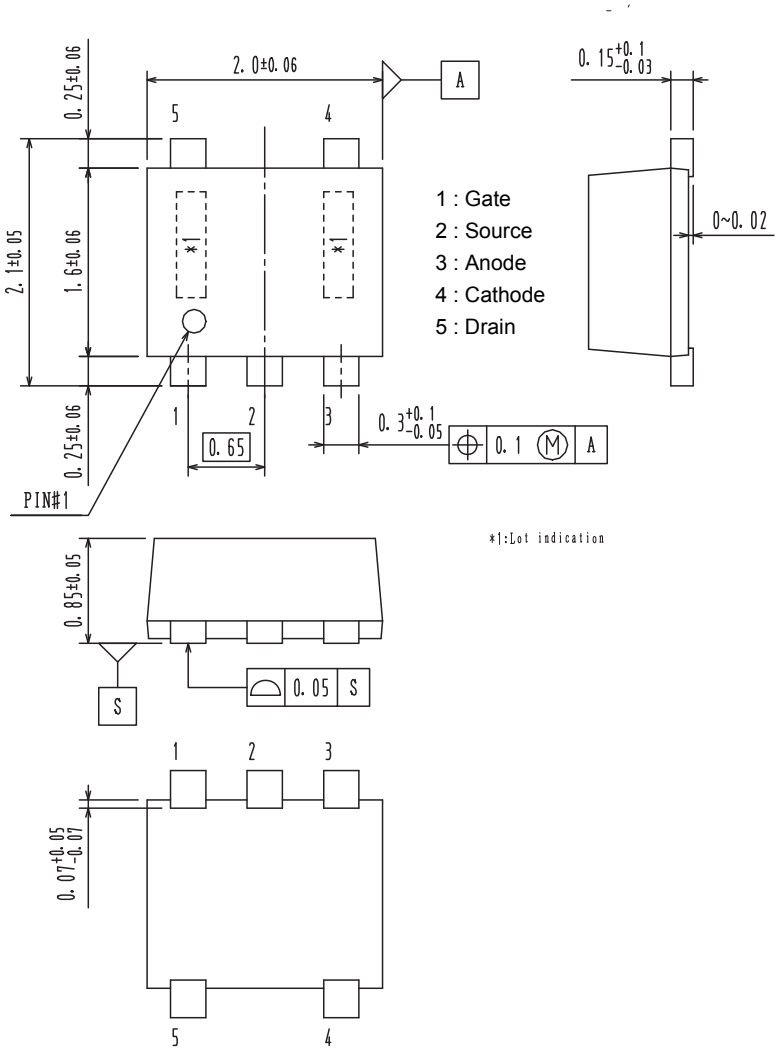

IFSM – t
[SBD]
Current waveform 50Hz sine wave
IS
20ms
t
Surge Forward Current, IFSM(Peak) – A
Time, t – s
ID00338


RθJA – Pulse Time
Thermal Resistance, RθJA – °C/W
Duty Cycle=0.5
0.2
0.1
0.05
0.02
0.01
Single Pulse
When mounted on ceramic substrate
(1000mm²×0.8mm)
Pulse Time, PT – s
IT17933

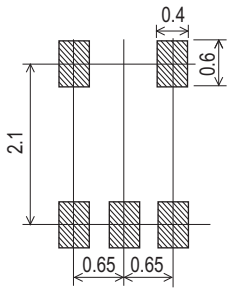
PACKAGE DIMENSIONS

unit : mm

SC-88AFL / MCPH5
CASE 419AP
ISSUE O



Recommended Soldering Footprint



ORDERING INFORMATION

Device	Marking	Package	Shipping (Qty / Packing)
MCH5839-TL-H	YD	SC-88AFL / MCPH5 (Pb-Free / Halogen Free)	3,000 / Tape & Reel
MCH5839-TL-W			

† For information on tape and reel specifications, including part orientation and tape sizes, please refer to our Tape and Reel Packaging Specifications Brochure, BRD8011/D. http://www.onsemi.com/pub_link/Collateral/BRD8011-D.PDF

Note on usage : Since the MCH5839 is a MOSFET product, please avoid using this device in the vicinity of highly charged objects.

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Authorized Distributor

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MCH5839-TL-H MCH5839-TL-W