MCH3383

Power MOSFET
–12V, 69mΩ, –3.5A, Single P-Channel

ON Semiconductor®

www.onsemi.com

This Power MOSFET is produced using ON Semiconductor's trench technology, which is specifically designed to minimize gate charge and low on resistance. This device is suitable for applications with low gate charge driving or low on resistance requirements.

Features

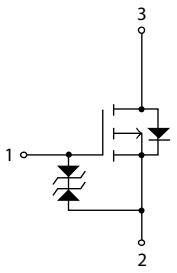
- Low On-Resistance
- 0.9V drive
- ESD Diode-Protected Gate
- Pb-Free, Halogen Free and RoHS compliance

Typical Applications

- LED Current Balance SW
- Load Switch

V_{DSS}	R_{DS}(on) Max	I_D Max
–12V	69mΩ@ –2.5V	–3.5A
	98mΩ@ –1.8V	
	173mΩ@ –1.2V	
	500mΩ@ –0.9V	

ELECTRICAL CONNECTION
P-Channel



1 : Gate
2 : Source
3 : Drain

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

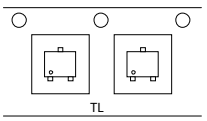
Parameter	Symbol	Value	Unit
Drain to Source Voltage	V_{DSS}	–12	V
Gate to Source Voltage	V_{GSS}	±5	V
Drain Current (DC)	I_D	–3.5	A
Drain Current (Pulse) PW ≤ 10μs, duty cycle ≤ 1%	I_{DP}	–14	A
Power Dissipation When mounted on ceramic substrate (900mm^2 × 0.8mm)	P_D	1.0	W
Junction Temperature	Tj	150	°C
Operating Temperature	Topr	–5 to +150	°C
Storage Temperature	Tstg	–55 to +150	°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.

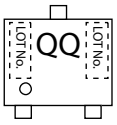
THERMAL RESISTANCE RATINGS

Parameter	Symbol	Value	Unit
Junction to Ambient When mounted on ceramic substrate (900mm^2 × 0.8mm)	$R_{\theta JA}$	125	°C/W

PACKING TYPE : TL



MARKING



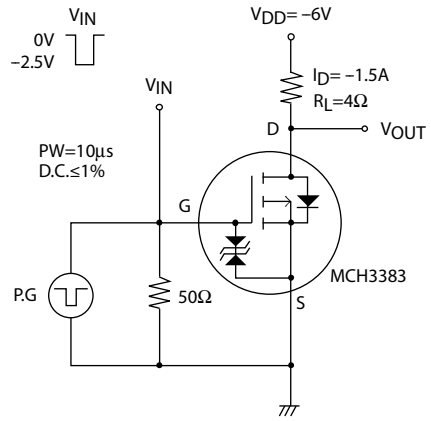
ORDERING INFORMATION
See detailed ordering and shipping information on page 5 of this data sheet.

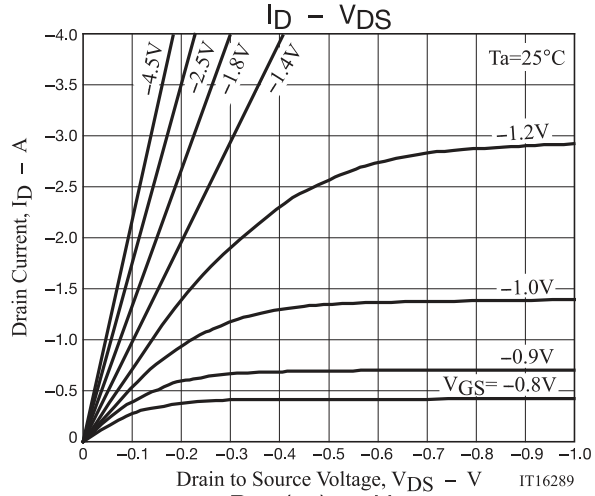
ELECTRICAL CHARACTERISTICS at Ta = 25°C (Note 2)

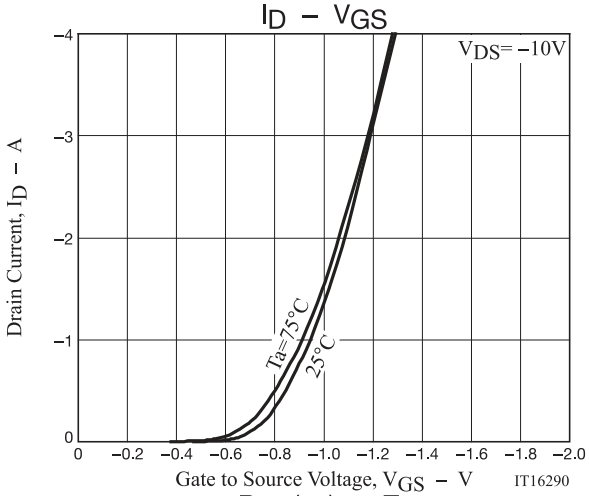
Parameter	Symbol	Conditions	Value			Unit
			min	typ	max	
Drain to Source Breakdown Voltage	$V_{(BR)DSS}$	I_D=−1mA, V_{GS}=0V	−12			V
Zero-Gate Voltage Drain Current	I_{DSS}	V_{DS}=−12V, V_{GS}=0V			−10	μA
Gate to Source Leakage Current	I_{GSS}	V_{GS}=±4V, V_{DS}=0V			±10	μA
Gate Threshold Voltage	$V_{GS}(th)$	V_{DS}=−6V, I_D=−1mA	−0.3		−0.8	V
Forward Transconductance	g_{FS}	V_{DS}=−6V, I_D=−1.5A		5.3		S
Static Drain to Source On-State Resistance	$R_{DS}(on)1$	I_D=−1.5A, V_{GS}=−2.5V		57	69	mΩ
	$R_{DS}(on)2$	I_D=−0.7A, V_{GS}=−1.8V		75	98	mΩ
	$R_{DS}(on)3$	I_D=−0.3A, V_{GS}=−1.2V		115	173	mΩ
	$R_{DS}(on)4$	I_D=−50mA, V_{GS}=−0.9V		250	500	mΩ
Input Capacitance	Ciss	V_{DS}=−6V, f=1MHz		1010		pF
Output Capacitance	Coss			130		pF
Reverse Transfer Capacitance	Crss			85		pF
Turn-ON Delay Time	$t_d(on)$	See specified Test Circuit		9.9		ns
Rise Time	t_r			49		ns
Turn-OFF Delay Time	$t_d(off)$			109		ns
Fall Time	t_f			65		ns
Total Gate Charge	Qg	V_{DS}=−6V, V_{GS}=−2.5V, I_D=−3.5A		6.2		nC
Gate to Source Charge	Qgs			1.6		nC
Gate to Drain “Miller” Charge	Qgd			1.1		nC
Forward Diode Voltage	V_{SD}	I_S=−3.5A, V_{GS}=0V		−0.83	−1.2	V

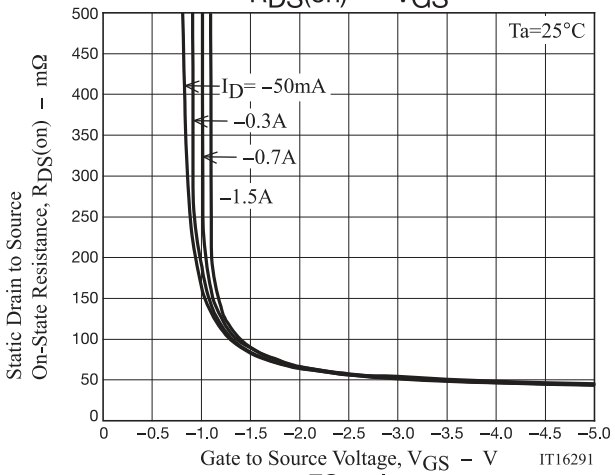
Note 2 : Product parametric performance is indicated in the Electrical Characteristics for the listed test conditions, unless otherwise noted. Product performance may not be indicated by the Electrical Characteristics if operated under different conditions.

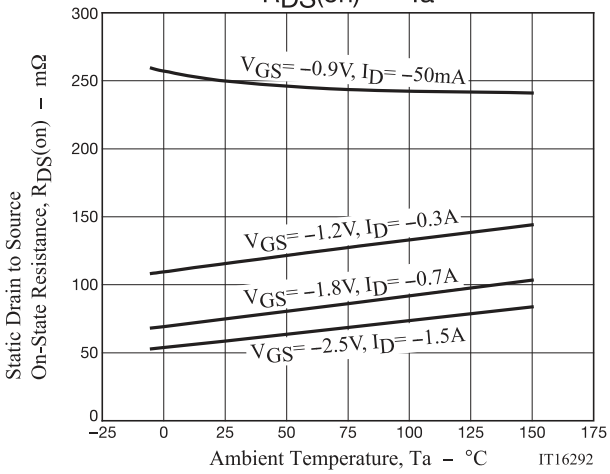
Switching Time Test Circuit

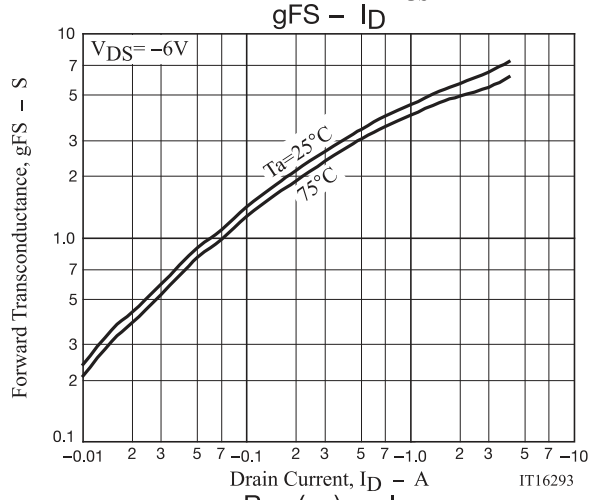


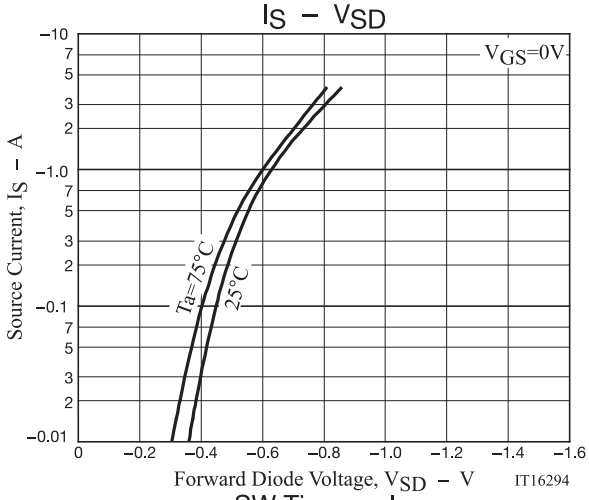

ID – VDS
Ta=25°C
–4.5V
–2.5V
–1.8V
–1.4V
–1.2V
–1.0V
–0.9V
VGS= –0.8V
Drain Current, ID – A
Drain to Source Voltage, VDS – V
IT16289

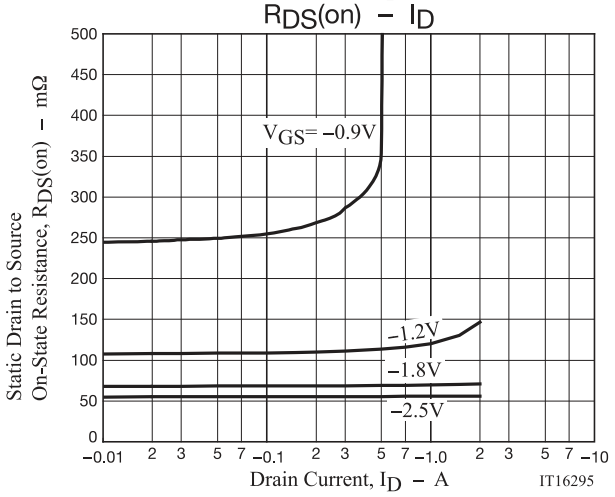

ID – VGS
VDS= –10V
Ta=75°C
25°C
Drain Current, ID – A
Gate to Source Voltage, VGS – V
IT16290

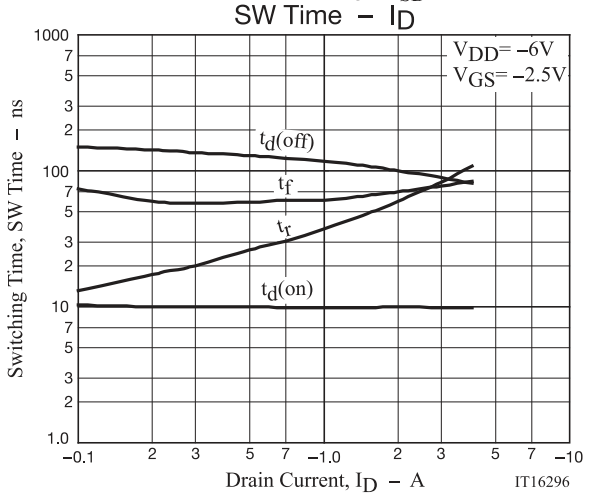

RDS(on) – VGS
Ta=25°C
ID= –50mA
–0.3A
–0.7A
–1.5A
Static Drain to Source On-State Resistance, RDS(on) – mΩ
Gate to Source Voltage, VGS – V
IT16291

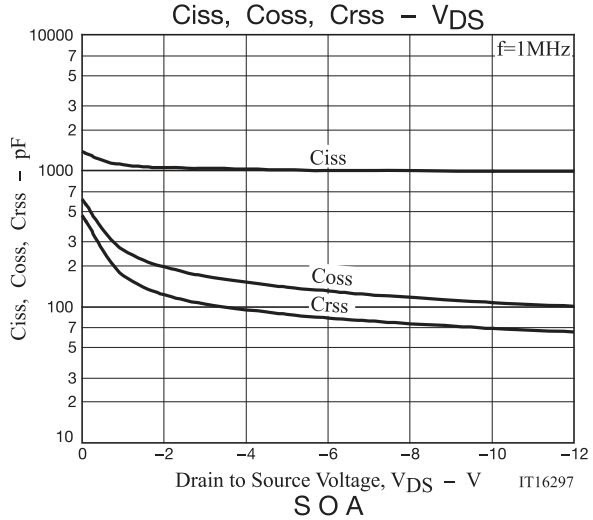

RDS(on) – Ta
VGS= –0.9V, ID= –50mA
VGS= –1.2V, ID= –0.3A
VGS= –1.8V, ID= –0.7A
VGS= –2.5V, ID= –1.5A
Static Drain to Source On-State Resistance, RDS(on) – mΩ
Ambient Temperature, Ta – °C
IT16292

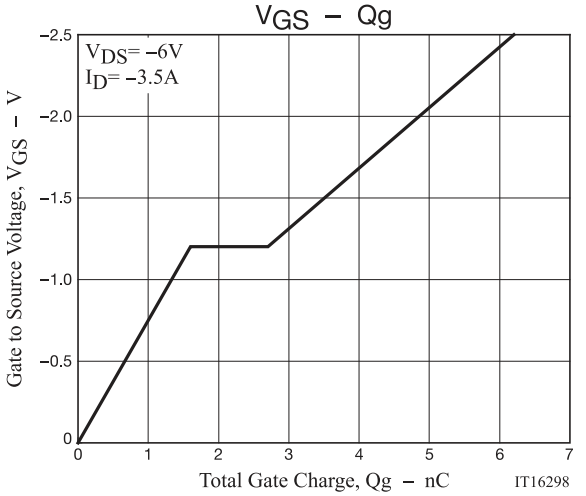

gFS – ID
VDS= –6V
Ta=–25°C
75°C
Forward Transconductance, gFS – S
Drain Current, ID – A
IT16293

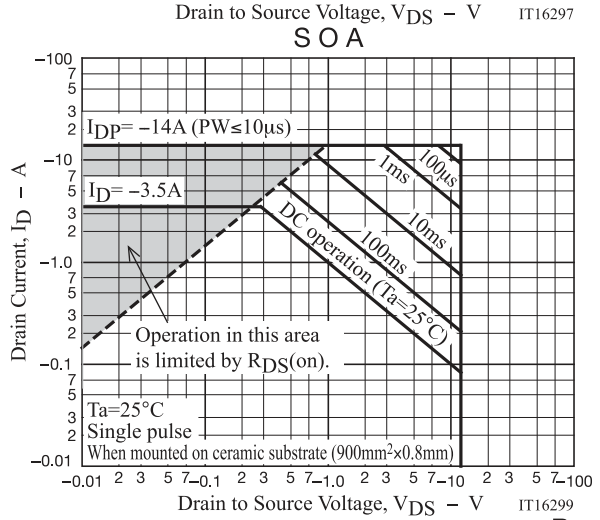

IS – VSD
VGS=0V
Ta=75°C
25°C
Source Current, IS – A
Forward Diode Voltage, VSD – V
IT16294

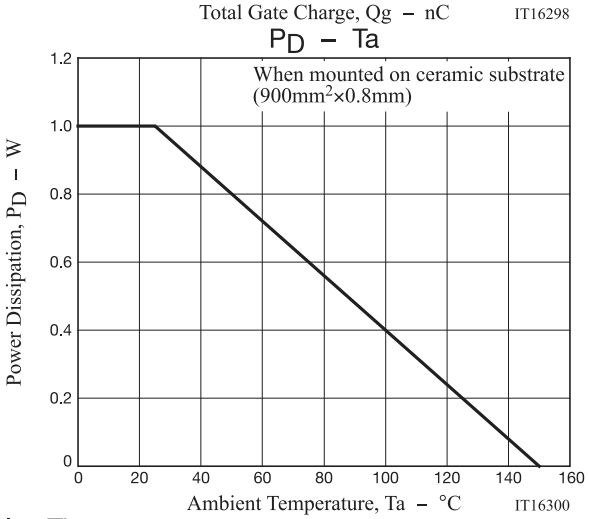

RDS(on) – ID
VGS= –0.9V
–1.2V
–1.8V
–2.5V
Static Drain to Source On-State Resistance, RDS(on) – mΩ
Drain Current, ID – A
IT16295

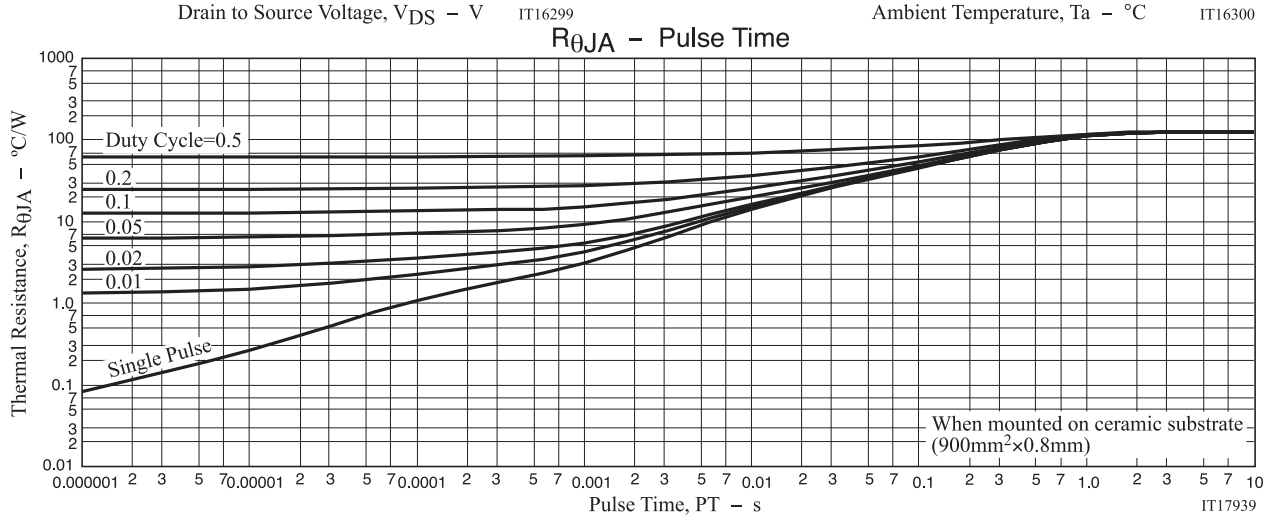

SW Time – ID
VDD= –6V
VGS= –2.5V
td(off)
tf
tr
td(on)
Switching Time, SW Time – ns
Drain Current, ID – A
IT16296


Ciss, Coss, Crss – VDS
f=1MHz
Ciss
Coss
Crss
Ciss, Coss, Crss – pF
Drain to Source Voltage, VDS – V
IT16297


VGS – Qg
VDS= –6V
ID= –3.5A
Gate to Source Voltage, VGS – V
Total Gate Charge, Qg – nC
IT16298


S O A
IDP= –14A (PW≤10μs)
ID= –3.5A
1ms
100μs
10ms
100ms
DC operation (Ta=25°C)
Operation in this area
is limited by RDS(on).
Ta=25°C
Single pulse
When mounted on ceramic substrate (900mm2×0.8mm)
Drain Current, ID – A
Drain to Source Voltage, VDS – V
IT16299

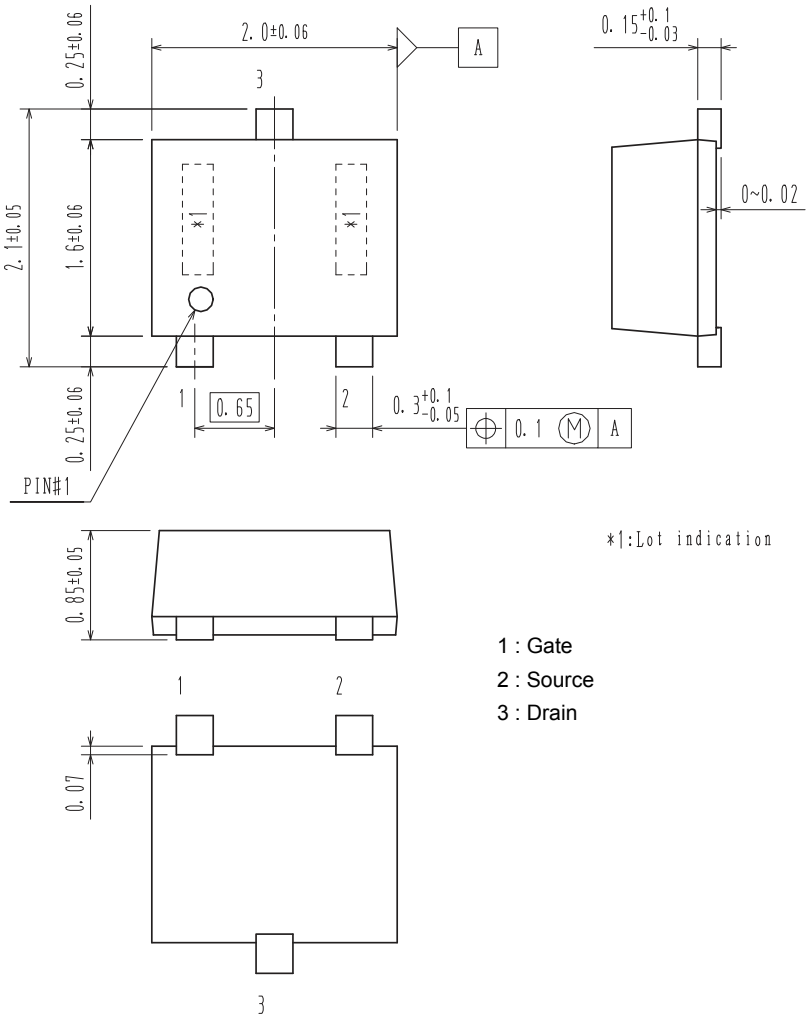

PD – Ta
When mounted on ceramic substrate
(900mm2×0.8mm)
Power Dissipation, PD – W
Ambient Temperature, Ta – °C
IT16300


RθJA – Pulse Time
Duty Cycle=0.5
0.2
0.1
0.05
0.02
0.01
Single Pulse
When mounted on ceramic substrate
(900mm2×0.8mm)
Thermal Resistance, RθJA – °C/W
Pulse Time, PT – s
IT17939

PACKAGE DIMENSIONS

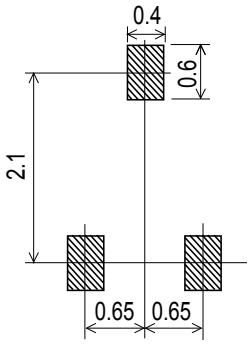
unit : mm

SC-70FL / **MCPH3**
CASE 419AQ
ISSUE O



1 : Gate
2 : Source
3 : Drain

Recommended Soldering Footprint



ORDERING INFORMATION

Device	Marking	Package	Shipping (Qty / Packing)
MCH3383-TL-H	QQ	SC-70FL / MCPH3 (Pb-Free / Halogen Free)	3,000 / Tape & Reel
MCH3383-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 MCH3383 is a MOSFET product, please avoid using this device in the vicinity of highly charged objects.