MCH6431

Power MOSFET
30V, 55mΩ, 5A, Single N-Channel

ON Semiconductor®

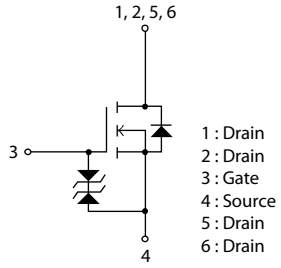
www.onsemi.com

V_{DSS}	R_{DS}(on) Max	I_D Max
30V	55mΩ@ 10V	5A
	91mΩ@ 4.5V	
	109mΩ@ 4V	

Features

- Low On-Resistance
- 4V Drive
- ESD Diode-Protected Gate
- Pb-Free, Halogen Free and RoHS Compliance

Electrical Connection
N-Channel



Specifications

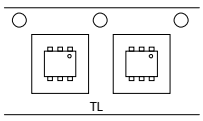
Absolute Maximum Ratings at Ta = 25°C

Parameter	Symbol	Value	Unit
Drain to Source Voltage	V_{DSS}	30	V
Gate to Source Voltage	V_{GSS}	±20	V
Drain Current (DC)	I_D	5	A
Drain Current (Pulse) PW≤10μs, duty cycle≤1%	I_{DP}	20	A
Power Dissipation When mounted on ceramic substrate (1200mm^2 × 0.8mm)	P_D	1.5	W
Junction Temperature	Tj	150	°C
Storage Temperature	Tstg	–55 to +150	°C

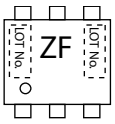
Thermal Resistance Ratings

Parameter	Symbol	Value	Unit
Junction to Ambient When mounted on ceramic substrate (1200mm^2 × 0.8mm)	$R_{\theta JA}$	83.3	°C/W

Packing Type : TL



Marking



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.

ORDERING INFORMATION

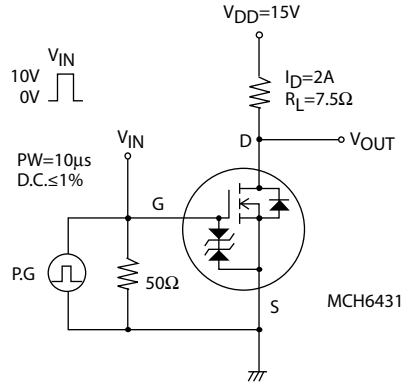
See detailed ordering and shipping information on page 5 of this data sheet.

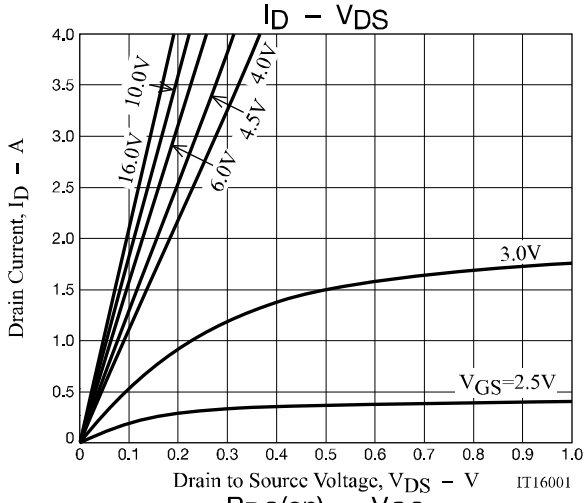
Electrical Characteristics at Ta = 25°C

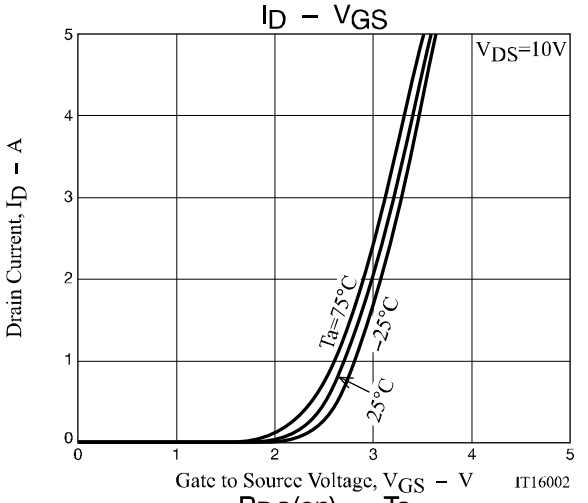
Parameter	Symbol	Conditions	Value			Unit
			min	typ	max	
Drain to Source Breakdown Voltage	$V_{(BR)DSS}$	I_D=1mA, V_{GS}=0V	30			V
Zero-Gate Voltage Drain Current	I_{DSS}	V_{DS}=30V, V_{GS}=0V			1	μA
Gate to Source Leakage Current	I_{GSS}	V_{GS}=±16V, V_{DS}=0V			±10	μA
Gate Threshold Voltage	$V_{GS}(th)$	V_{DS}=10V, I_D=1mA	1.2		2.6	V
Forward Transconductance	g_{FS}	V_{DS}=10V, I_D=2.5A		2.2		S
Static Drain to Source On-State Resistance	$R_{DS}(on)1$	I_D=2.5A, V_{GS}=10V		42	55	mΩ
	$R_{DS}(on)2$	I_D=1.2A, V_{GS}=4.5V		65	91	mΩ
	$R_{DS}(on)3$	I_D=1.2A, V_{GS}=4V		78	109	mΩ
Input Capacitance	Ciss	V_{DS}=10V, f=1MHz		280		pF
Output Capacitance	Coss			60		pF
Reverse Transfer Capacitance	Crss			30		pF
Turn-ON Delay Time	$t_d(on)$	See specified Test Circuit		5.7		ns
Rise Time	t_r			11		ns
Turn-OFF Delay Time	$t_d(off)$			21		ns
Fall Time	t_f			10		ns
Total Gate Charge	Qg	V_{DS}=15V, V_{GS}=10V, I_D=5A		5.6		nC
Gate to Source Charge	Qgs			1.2		nC
Gate to Drain “Miller” Charge	Qgd			0.8		nC
Forward Diode Voltage	V_{SD}	I_S=5A, V_{GS}=0V		0.85	1.2	V

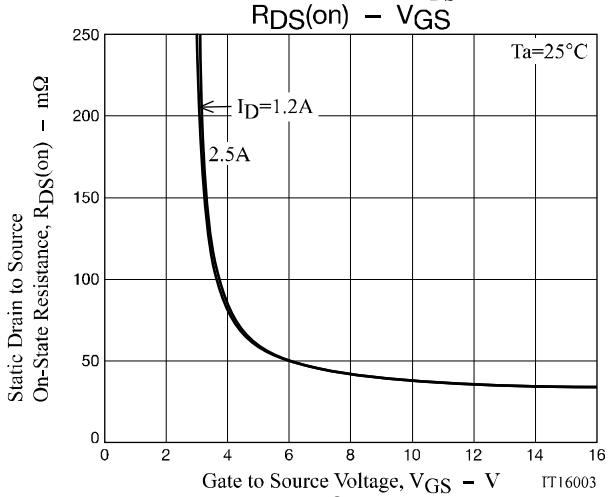
Product parametric performance is indicated in the Electrical Characteristics for the listed test conditions, unless otherwise noted. Product performance may not be indicated by the Electrical Characteristics if operated under different conditions.

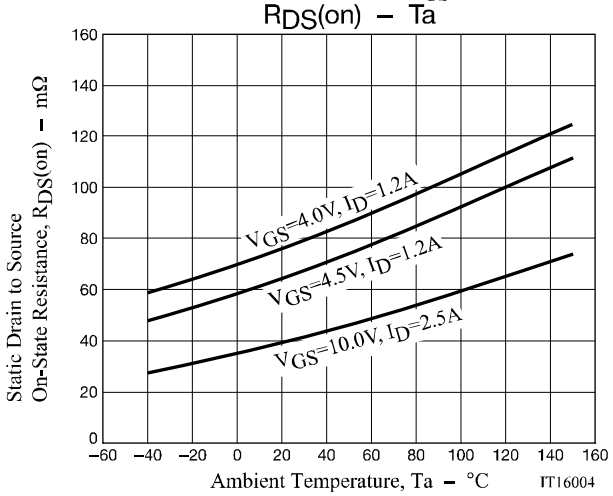
Switching Time Test Circuit

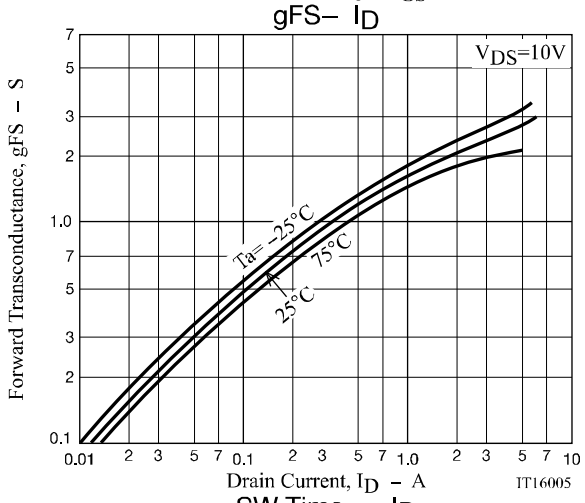


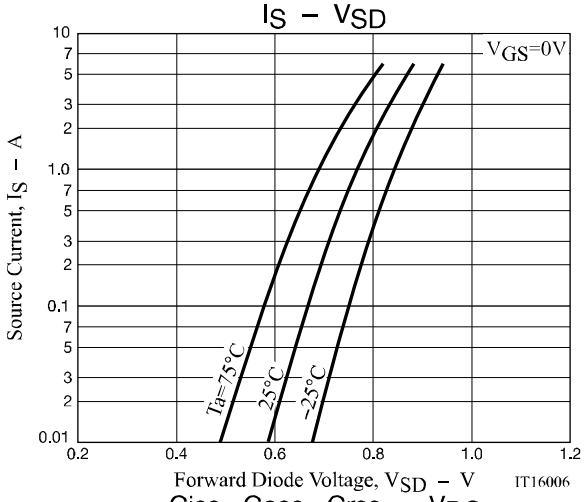

ID – VDS
Drain Current, ID – A
Drain to Source Voltage, VDS – V
IT16001
16.0V
10.0V
6.0V
4.5V
4.0V
3.0V
VGS=2.5V

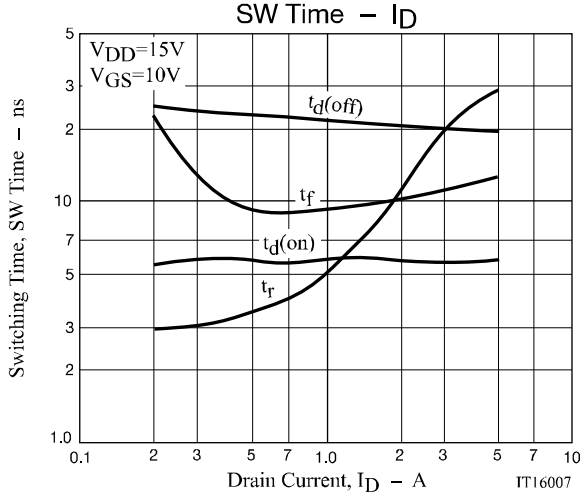

ID – VGS
Drain Current, ID – A
Gate to Source Voltage, VGS – V
IT16002
VDS=10V
Ta=75°C
–25°C
25°C

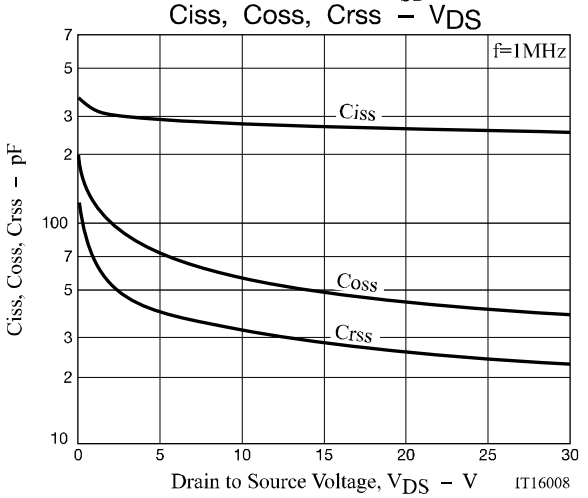

RDS(on) – VGS
Static Drain to Source
On-State Resistance, RDS(on) – mΩ
Gate to Source Voltage, VGS – V
IT16003
Ta=25°C
ID=1.2A
2.5A

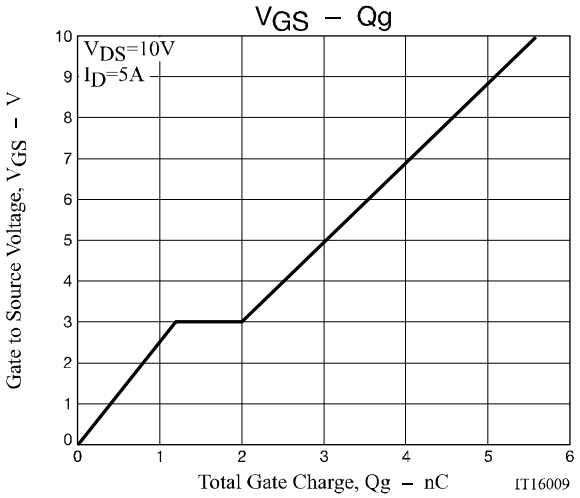

RDS(on) – Ta
Static Drain to Source
On-State Resistance, RDS(on) – mΩ
Ambient Temperature, Ta – °C
IT16004
VGS=4.0V, ID=1.2A
VGS=4.5V, ID=1.2A
VGS=10.0V, ID=2.5A

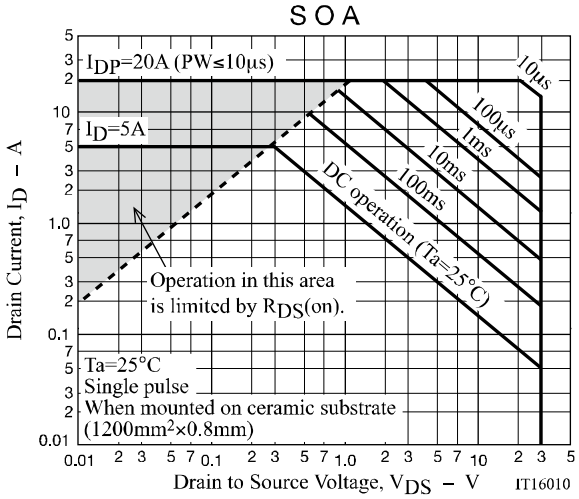

gFS– ID
Forward Transconductance, gFS – S
Drain Current, ID – A
IT16005
VDS=10V
Ta= –25°C
75°C
25°C

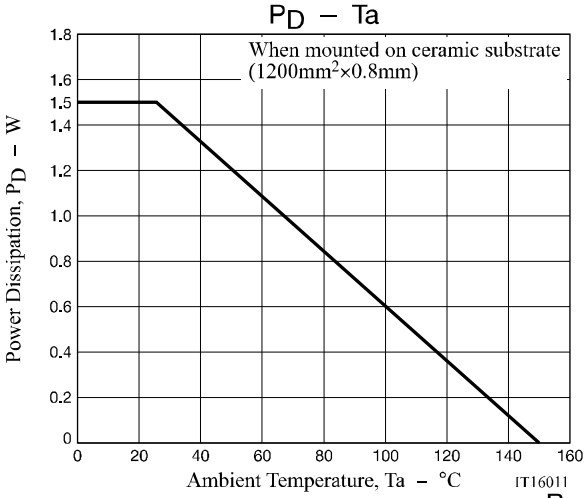

IS – VSD
Source Current, IS – A
Forward Diode Voltage, VSD – V
IT16006
VGS=0V
Ta=75°C
25°C
–25°C

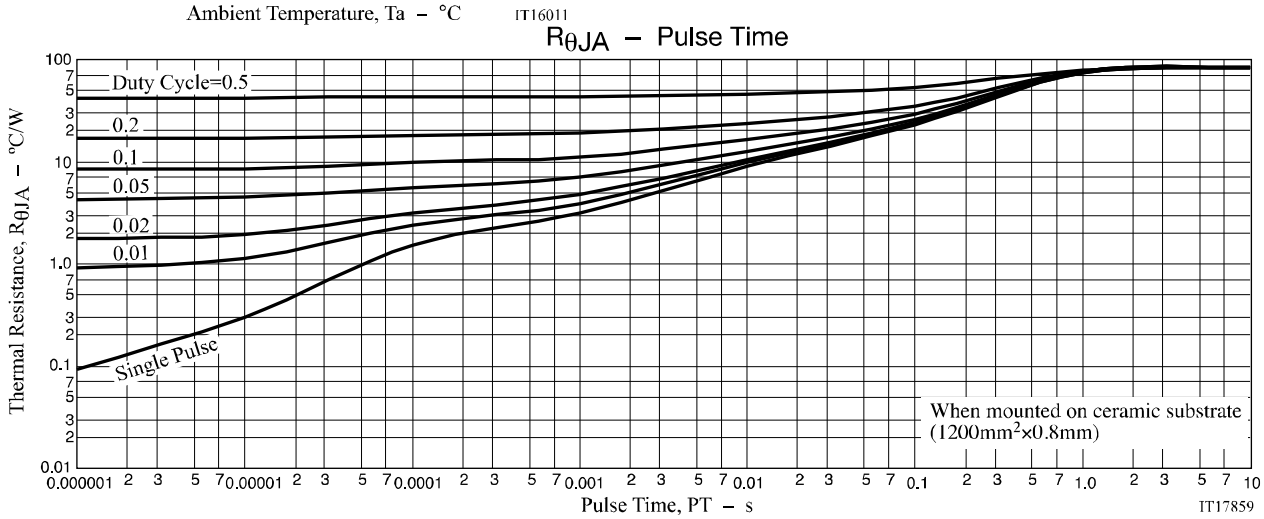

SW Time – ID
Switching Time, SW Time – ns
Drain Current, ID – A
IT16007
VDD=15V
VGS=10V
td(off)
tf
td(on)
tr


Ciss, Coss, Crss – VDS
Ciss, Coss, Crss – pF
Drain to Source Voltage, VDS – V
IT16008
f=1MHz
Ciss
Coss
Crss


VGS – Qg
VDS=10V
ID=5A
Gate to Source Voltage, VGS – V
Total Gate Charge, Qg – nC
IT16009


S O A
IDP=20A (PW≤10μs)
ID=5A
10μs
100μs
1ms
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
(1200mm2×0.8mm)
Drain Current, ID – A
Drain to Source Voltage, VDS – V
IT16010


PD – Ta
When mounted on ceramic substrate
(1200mm2×0.8mm)
Power Dissipation, PD – W
Ambient Temperature, Ta – °C
IT16011


RθJA – Pulse Time
Duty Cycle=0.5
0.2
0.1
0.05
0.02
0.01
Single Pulse
When mounted on ceramic substrate
(1200mm2×0.8mm)
Thermal Resistance, RθJA – °C/W
Pulse Time, PT – s
IT17859

Package Dimensions

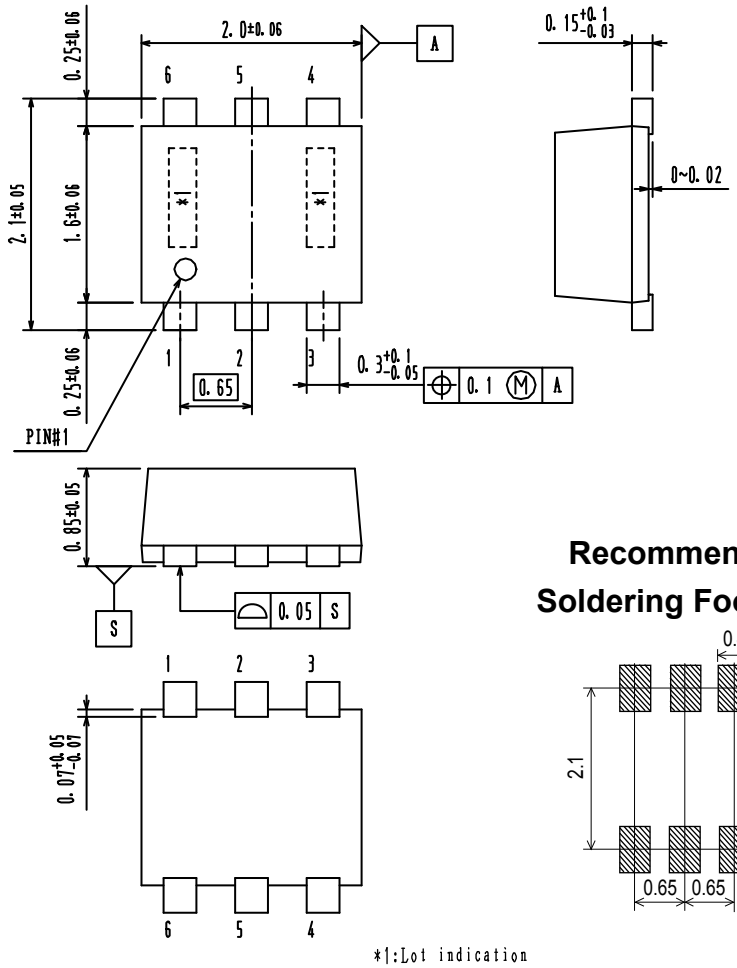
MCH6431-TL-H / MCH6431-TL-W

MCPH6

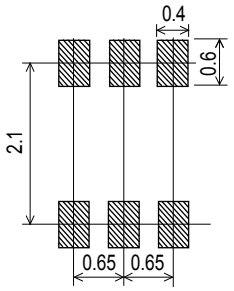
CASE 419AS
ISSUE O

unit : mm

1 : Drain
2 : Drain
3 : Gate
4 : Source
5 : Drain
6 : Drain



Recommended Soldering Footprint



ORDERING INFORMATION

Device	Package	Shipping	Note
MCH6431-TL-H	MCPH6 SC-88FL,SC-70-6,SOT-363	3,000 pcs. / Tape & Reel	Pb-Free and Halogen Free
MCH6431-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 MCH6431 is a MOSFET product, please avoid using this device in the vicinity of highly charged objects.