MCH6663

Power MOSFET
30V, 188mΩ, 1.8A, –30V, 325mΩ, –1.5A, Complementary Dual

ON Semiconductor®

www.onsemi.com

Features

- ON-Resistance Nch : $R_{DS}(on)1$=145mΩ (typ)
  Pch : $R_{DS}(on)1$=250mΩ (typ)
- 4V Drive
- Complementary N-Channel and P-Channel MOSFET
- Pb-Free, Halogen Free and RoHS Compliance

V_{DSS}	$R_{DS}(on)$ Max	I_D Max
N-Ch 30V	188 mΩ@ 10V	1.8A
	343 mΩ@ 4.5V	
	378 mΩ@ 4V	
P-Ch –30V	325 mΩ@ –10V	–1.5A
	555 mΩ@ –4.5V	
	641 mΩ@ –4V	

Specifications

Absolute Maximum Ratings at Ta = 25°C

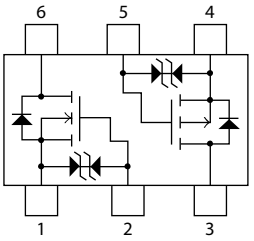
Parameter	Symbol	N-channel	P-channel	Unit
Drain to Source Voltage	V_{DSS}	30	–30	V
Gate to Source Voltage	V_{GSS}	±20	±20	V
Drain Current (DC)	I_D	1.8	–1.5	A
Drain Current (Pulse) PW≤10μs, duty cycle≤1%	I_{DP}	7.2	–6	A
Power Dissipation When mounted on ceramic substrate (900mm²×0.8mm) 1unit	P_D	0.8		W
Junction Temperature	Tj	150		°C
Storage Temperature	Tstg	–55 to +150		°C

This product is designed to "ESD immunity < 200V*", so please take care when handling.
* Machine Model

Thermal Resistance Ratings

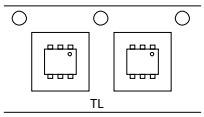
Parameter	Symbol	Value	Unit
Junction to Ambient When mounted on ceramic substrate (900mm²×0.8mm) 1unit	$R_{\theta JA}$	156.25	°C/W

Electrical Connection
N-Channel and P-Channel

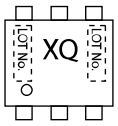


1 : Source1
2 : Gate1
3 : Drain2
4 : Source2
5 : Gate2
6 : Drain1

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 7 of this data sheet.

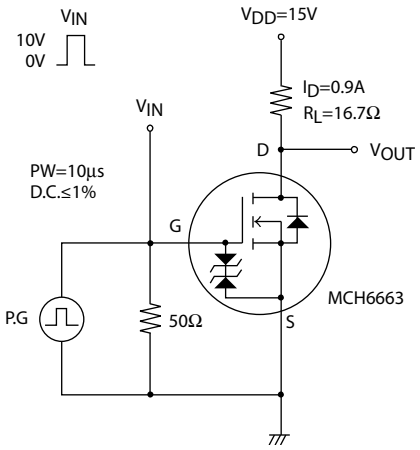
Electrical Characteristics at Ta = 25°C

Parameter	Symbol	Conditions	Value			Unit
			min	typ	max	
[N-channel]						
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=0.9A		1.1		S
Static Drain to Source On-State Resistance	$R_{DS}(on)1$	I_D=0.9A, V_{GS}=10V		145	188	mΩ
	$R_{DS}(on)2$	I_D=0.5A, V_{GS}=4.5V		245	343	mΩ
	$R_{DS}(on)3$	I_D=0.5A, V_{GS}=4V		270	378	mΩ
Input Capacitance	Ciss	V_{DS}=10V, f=1MHz		88		pF
Output Capacitance	Coss			19		pF
Reverse Transfer Capacitance	Crss			11		pF
Turn-ON Delay Time	$t_d(on)$	See specified Test Circuit		3.4		ns
Rise Time	t_r			3.6		ns
Turn-OFF Delay Time	$t_d(off)$			10.5		ns
Fall Time	t_f			4.0		ns
Total Gate Charge	Qg	V_{DS}=15V, V_{GS}=10V, I_D=1.8A		2.0		nC
Gate to Source Charge	Qgs			0.33		nC
Gate to Drain “Miller” Charge	Qgd			0.29		nC
Forward Diode Voltage	V_{SD}	I_S=1.8A, V_{GS}=0V		0.86	1.2	V
[P-channel]						
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=−0.8A		1.3		S
Static Drain to Source On-State Resistance	$R_{DS}(on)1$	I_D=−0.8A, V_{GS}=−10V		250	325	mΩ
	$R_{DS}(on)2$	I_D=−0.4A, V_{GS}=−4.5V		397	555	mΩ
	$R_{DS}(on)3$	I_D=−0.4A, V_{GS}=−4V		458	641	mΩ
Input Capacitance	Ciss	V_{DS}=−10V, f=1MHz		82		pF
Output Capacitance	Coss			22		pF
Reverse Transfer Capacitance	Crss			16		pF
Turn-ON Delay Time	$t_d(on)$	See specified Test Circuit		4.0		ns
Rise Time	t_r			3.3		ns
Turn-OFF Delay Time	$t_d(off)$			12		ns
Fall Time	t_f			5.4		ns
Total Gate Charge	Qg	V_{DS}=−15V, V_{GS}=−10V, I_D=−1.5A		2.2		nC
Gate to Source Charge	Qgs			0.36		nC
Gate to Drain “Miller” Charge	Qgd			0.49		nC
Forward Diode Voltage	V_{SD}	I_S=−1.5A, V_{GS}=0V		−0.9	−1.5	V

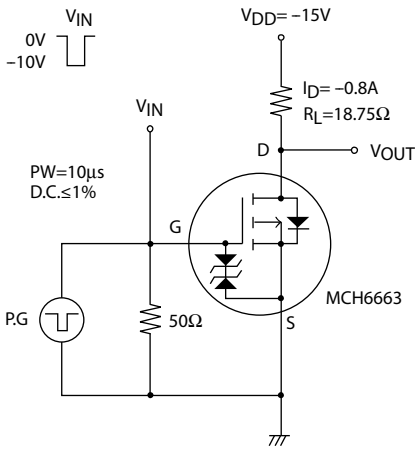
Product parametric performance is indicated in the Electrical Characteristics for the listed test conditions, unless otherwise noted. Product performance may not be indicated by the Electrical Characteristics if operated under different conditions.

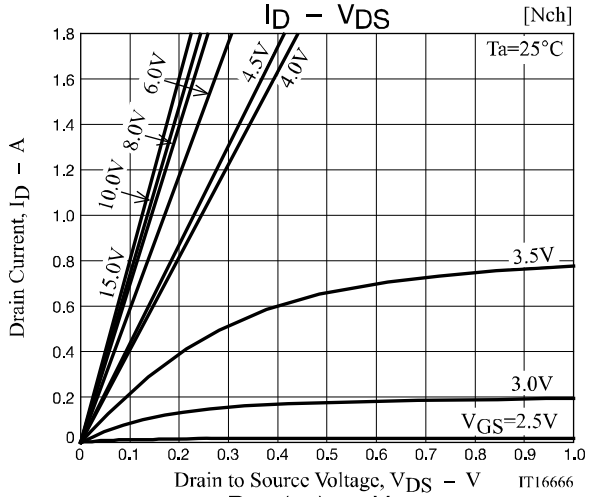
Switching Time Test Circuit

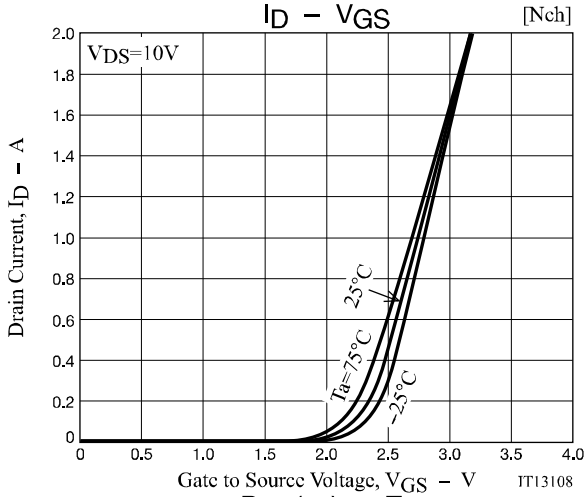
[N-channel]

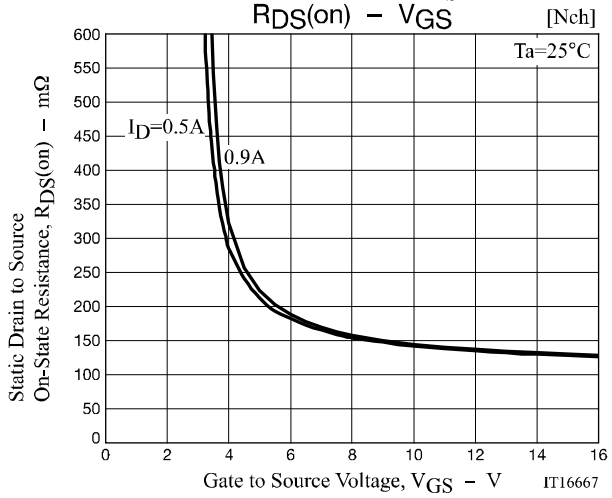


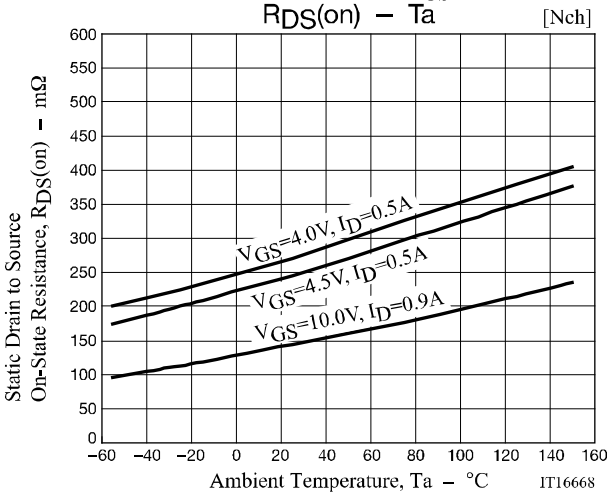
[P-channel]

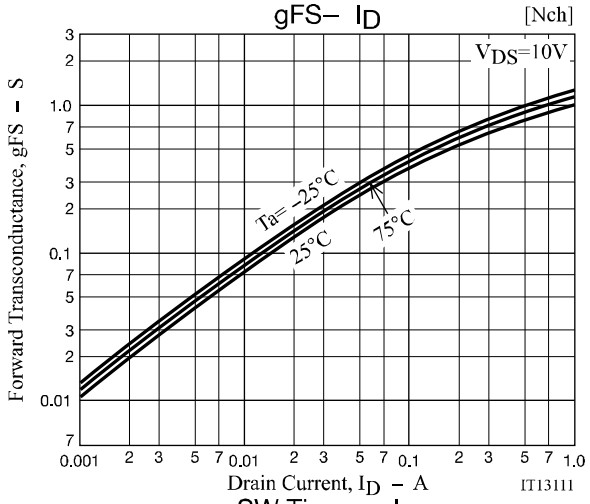


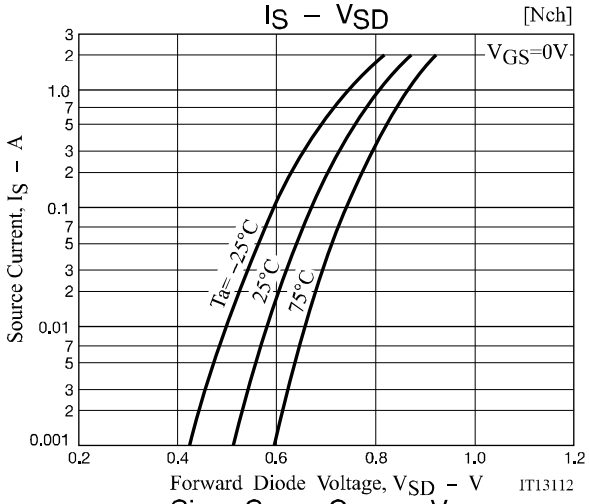


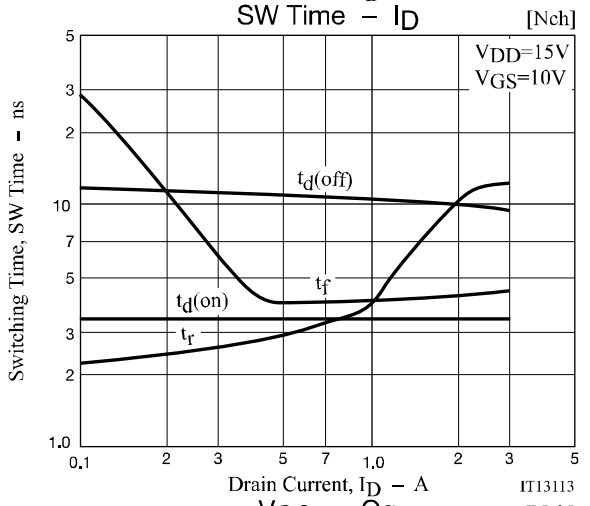


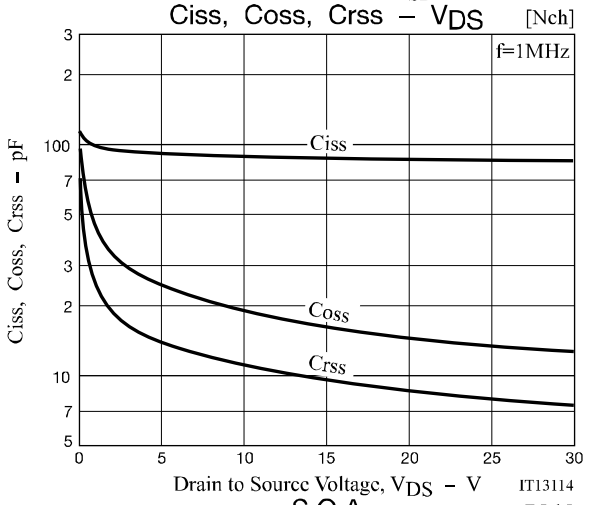


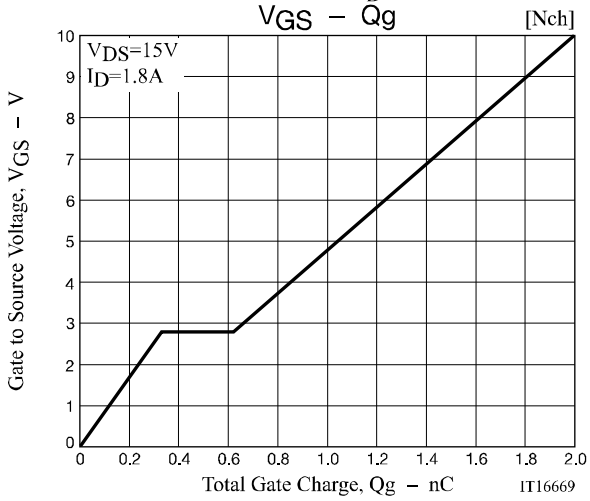


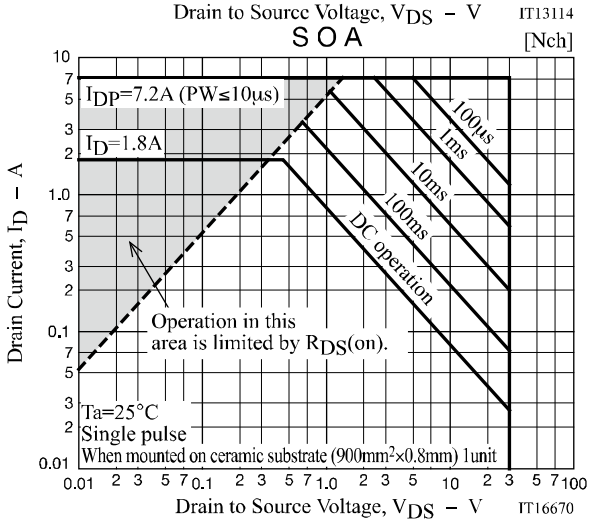

gFS– ID
[Nch]
VDS=10V
Ta= –25°C
25°C
75°C
Forward Transconductance, gFS – S
Drain Current, ID – A
IT13111

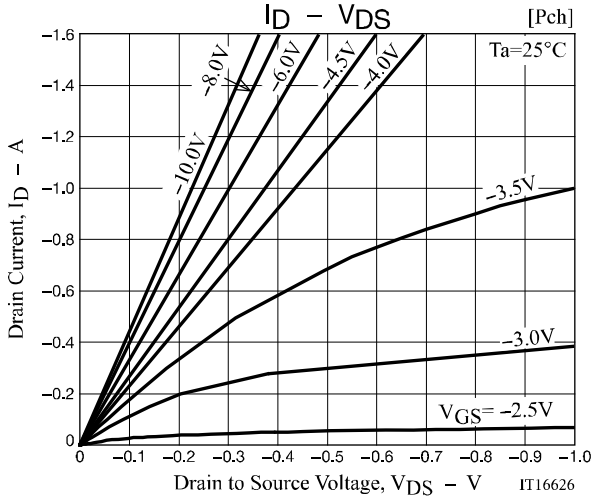

IS – VSD
[Nch]
VGS=0V
Ta= –25°C
25°C
75°C
Source Current, IS – A
Forward Diode Voltage, VSD – V
IT13112

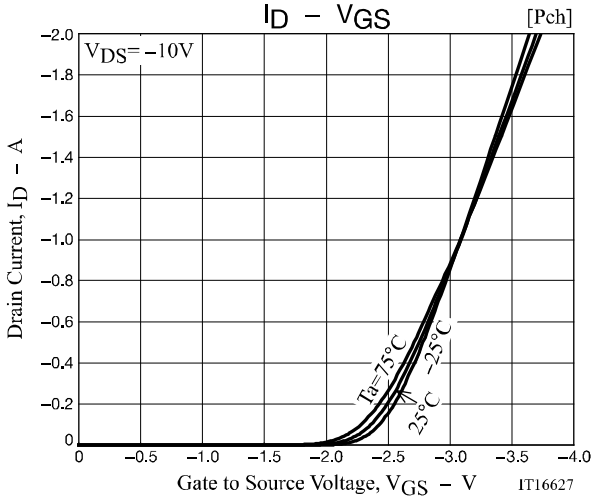

SW Time – ID
[Nch]
VDD=15V
VGS=10V
td(off)
tf
td(on)
tr
Switching Time, SW Time – ns
Drain Current, ID – A
IT13113

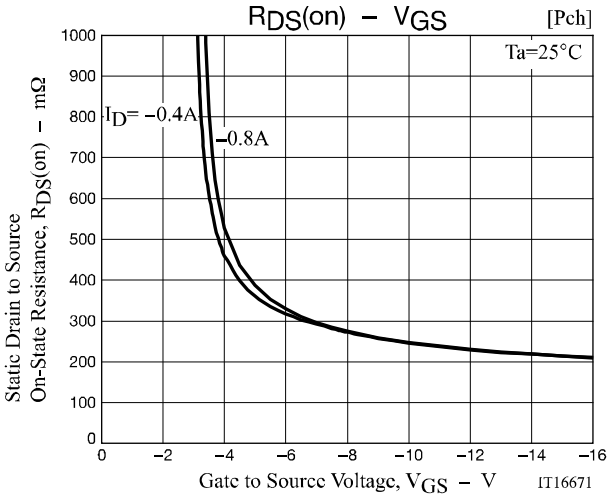

Ciss, Coss, Crss – VDS
[Nch]
f=1MHz
Ciss
Coss
Crss
Ciss, Coss, Crss – pF
Drain to Source Voltage, VDS – V
IT13114

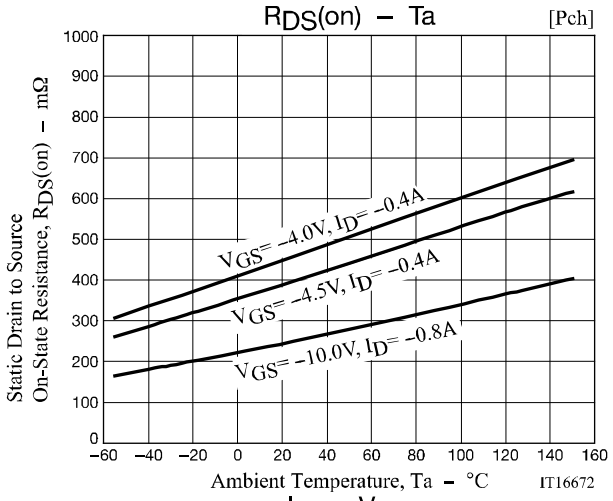

VGS – Qg
[Nch]
VDS=15V
ID=1.8A
Gate to Source Voltage, VGS – V
Total Gate Charge, Qg – nC
IT16669

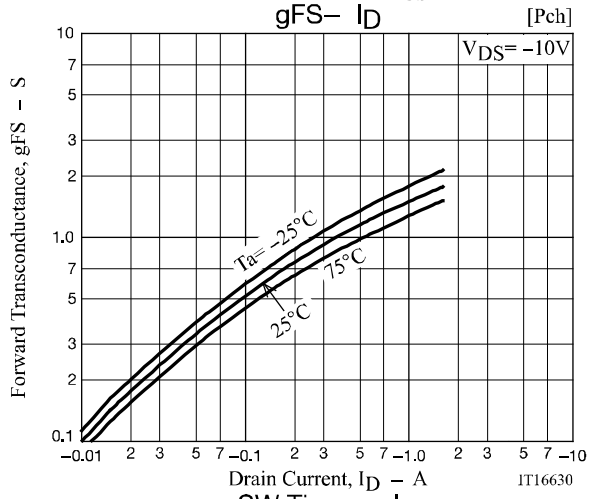

SOA
[Nch]
IDP=7.2A (PW≤10μs)
ID=1.8A
100μs
1ms
10ms
100ms
DC operation
Operation in this
area is limited by RDS(on).
Ta=25°C
Single pulse
When mounted on ceramic substrate (900mm²×0.8mm) 1unit
Drain Current, ID – A
Drain to Source Voltage, VDS – V
IT16670

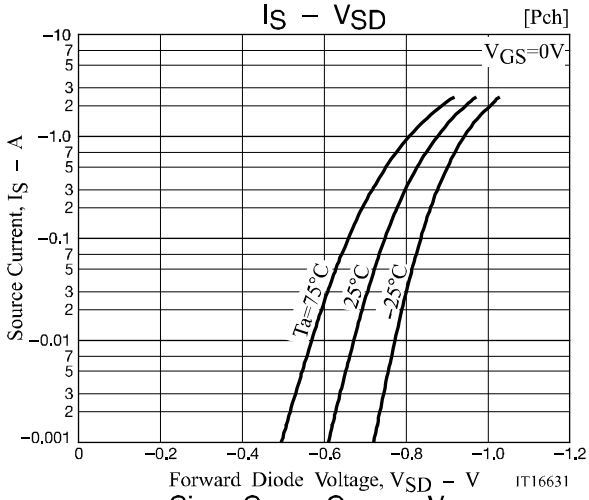

ID – VDS
[Pch]
Ta=25°C
–8.0V
–6.0V
–4.5V
–4.0V
–10.0V
–3.5V
–3.0V
VGS= –2.5V
Drain Current, ID – A
Drain to Source Voltage, VDS – V
IT16626

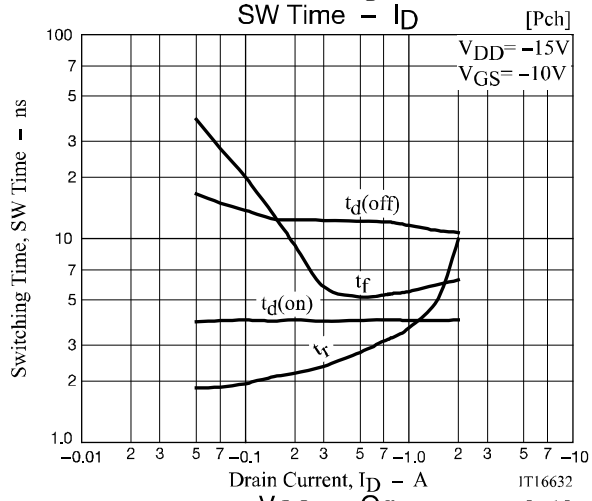

ID – VGS
[Pch]
VDS= –10V
Ta=75°C
–25°C
25°C
Drain Current, ID – A
Gate to Source Voltage, VGS – V
IT16627

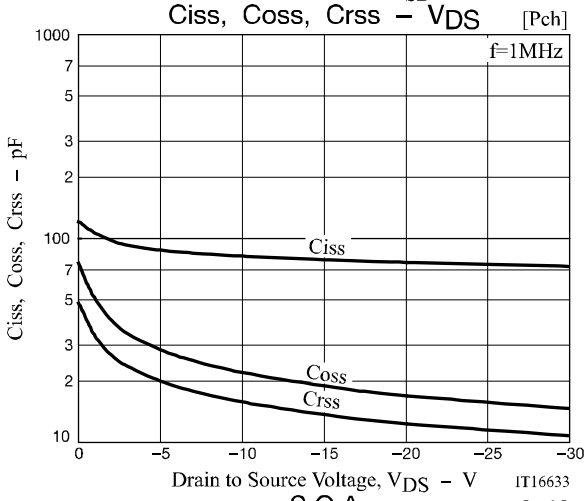

RDS(on) – VGS
[Pch]
Ta=25°C
ID= –0.4A
–0.8A
Static Drain to Source On-State Resistance, RDS(on) – mΩ
Gate to Source Voltage, VGS – V
IT16671

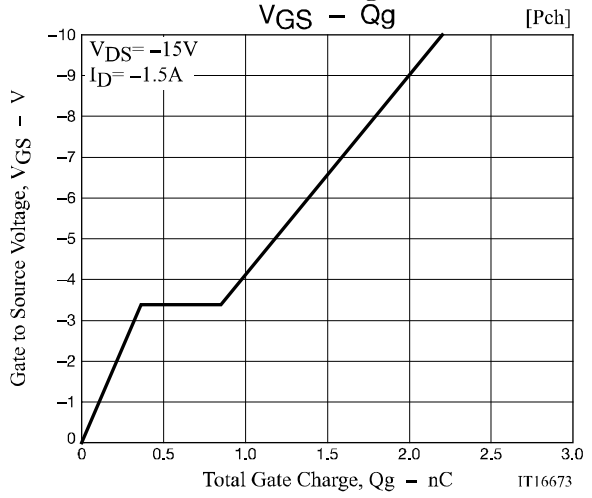

RDS(on) – Ta
[Pch]
VGS= –4.0V, ID= –0.4A
VGS= –4.5V, ID= –0.4A
VGS= –10.0V, ID= –0.8A
Static Drain to Source On-State Resistance, RDS(on) – mΩ
Ambient Temperature, Ta – °C
IT16672

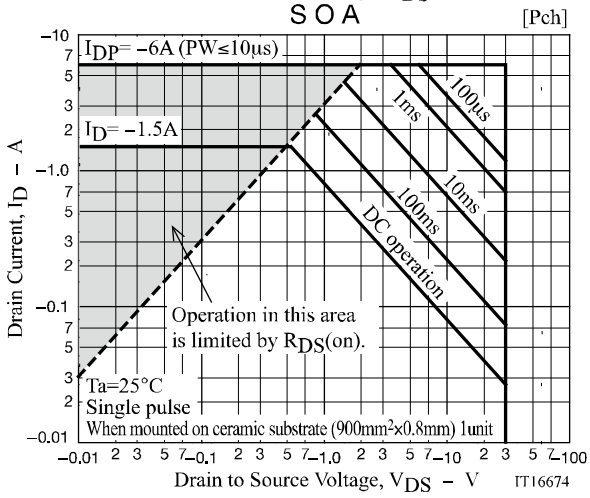

gFS– ID
[Pch]
VDS= –10V
Ta= –25°C
75°C
25°C
Forward Transconductance, gFS – S
Drain Current, ID – A
IT16630

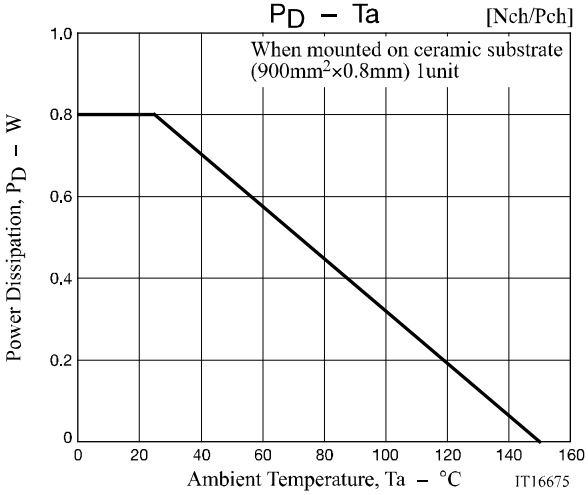

IS – VSD
[Pch]
VGS=0V
Ta=75°C
25°C
–25°C
Source Current, IS – A
Forward Diode Voltage, VSD – V
IT16631

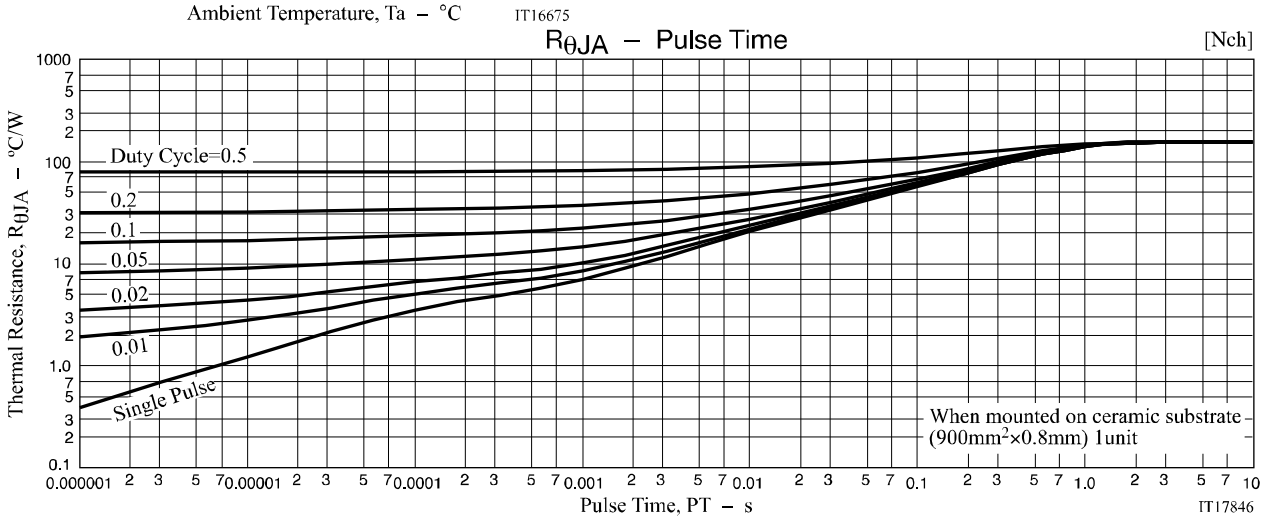

SW Time – ID
[Pch]
VDD= –15V
VGS= –10V
td(off)
tf
td(on)
tr
Switching Time, SW Time – ns
Drain Current, ID – A
IT16632

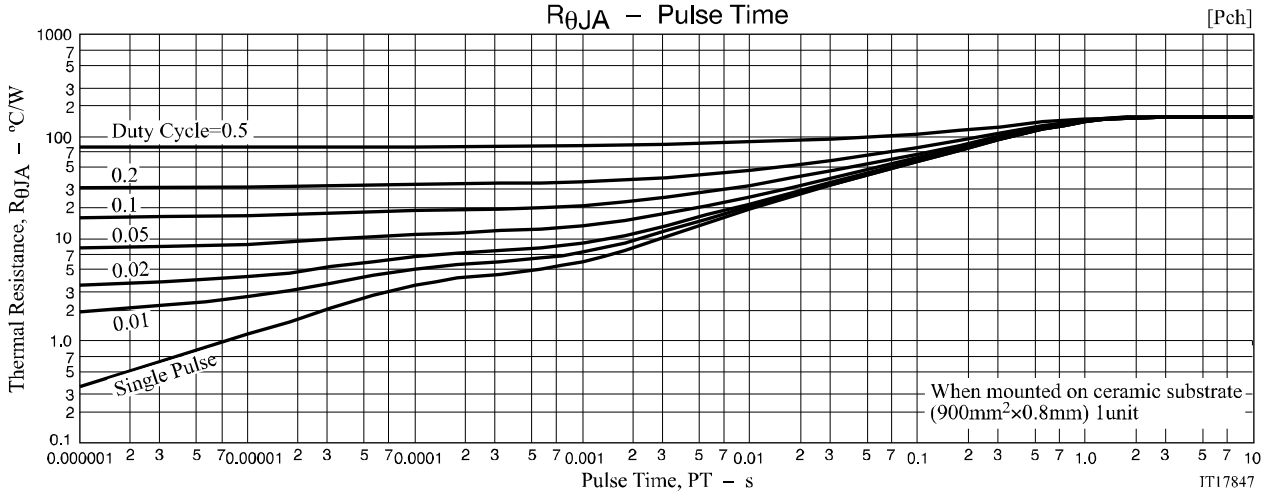

Ciss, Coss, Crss – VDS
[Pch]
f=1MHz
Ciss
Coss
Crss
Ciss, Coss, Crss – pF
Drain to Source Voltage, VDS – V
IT16633


VGS – Qg
[Pch]
VDS= –15V
ID= –1.5A
Gate to Source Voltage, VGS – V
Total Gate Charge, Qg – nC
IT16673


S O A
[Pch]
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 (900mm²×0.8mm) 1unit
Drain Current, ID – A
Drain to Source Voltage, VDS – V
IT16674


PD – Ta
[Nch/Pch]
When mounted on ceramic substrate
(900mm2×0.8mm) 1unit
Power Dissipation, PD – W
Ambient Temperature, Ta – °C
IT16675


RθJA – Pulse Time
[Nch]
Duty Cycle=0.5
0.2
0.1
0.05
0.02
0.01
Single Pulse
When mounted on ceramic substrate
(900mm2×0.8mm) 1unit
Thermal Resistance, RθJA – °C/W
Pulse Time, PT – s
IT17846


RθJA – Pulse Time
[Pch]
Duty Cycle=0.5
0.2
0.1
0.05
0.02
0.01
Single Pulse
When mounted on ceramic substrate
(900mm2×0.8mm) 1unit
Thermal Resistance, RθJA – °C/W
Pulse Time, PT – s
IT17847

Package Dimensions

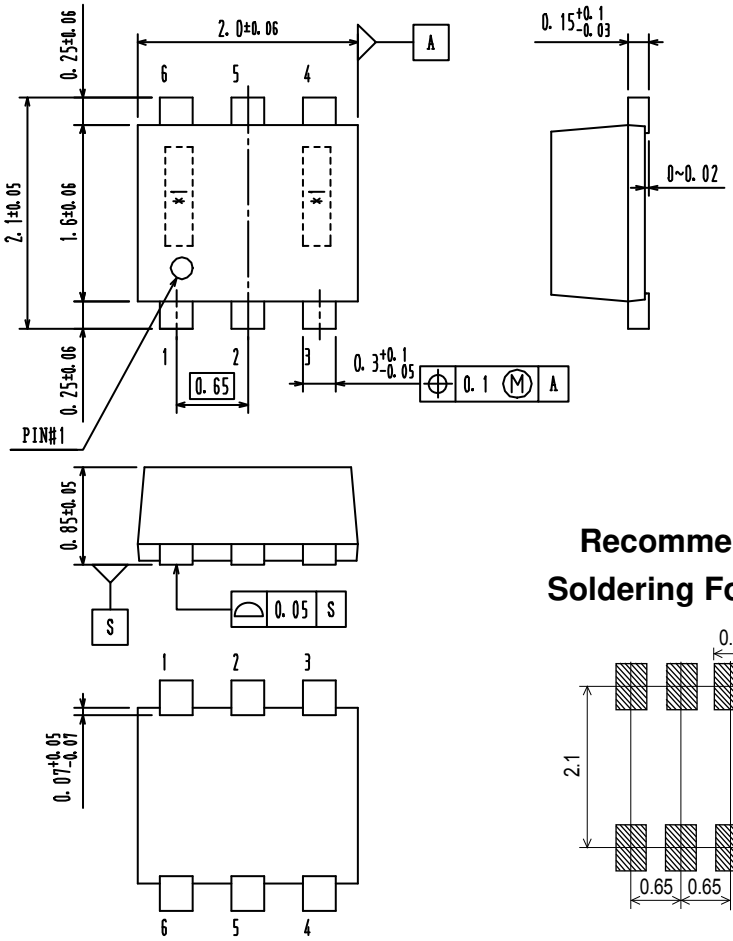
MCH6663-TL-H / MCH6663-TL-W

MCPH6

CASE 419AS
ISSUE O

unit : mm

1 : Source1
2 : Gate1
3 : Drain2
4 : Source2
5 : Gate 2
6 : Drain1



Recommended Soldering Footprint

ORDERING INFORMATION

Device	Package	Shipping	Note
MCH6663-TL-H	MCPH6 SC-88,SC-70-6,SOT-363	3,000 pcs. / Tape & Reel	Pb-Free and Halogen Free
MCH6663-TL-W			

Note on usage : Since the MCH6663 is a MOSFET product, please avoid using this device in the vicinity of highly charged objects.