Ordering number : EN6920C

MCH6613

Power MOSFET

30V, 0.35A, 3.7Ω −30V, −0.2A, 10.4Ω, Complementary Dual MCPH6

ON Semiconductor®

http://onsemi.com

Features

- The MCH6613 incorporates two elements in the same package which are N-channel and P-channel low ON resistance and high-speed switching MOSFETs, thereby enabling high-density mounting
- Excellent ON-resistance characteristic
- 1.5V drive

Specifications

Absolute Maximum Ratings at Ta=25°C

Parameter	Symbol	Conditions	N-channel	P-channel	Unit
Drain to Source Voltage	V_{DSS}		30	−30	V
Gate to Source Voltage	V_{GSS}		±10	±10	V
Drain Current (DC)	I_D		0.35	−0.2	A
Drain Current (Pulse)	I_{DP}	PW≤10μs, duty cycle≤1%	1.4	−0.8	A
Allowable Power Dissipation	P_D	When mounted on ceramic substrate (900mm²×0.8mm) 1unit	0.8		W
Channel Temperature	Tch		150		°C
Storage Temperature	Tstg		−55 to +150		°C

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

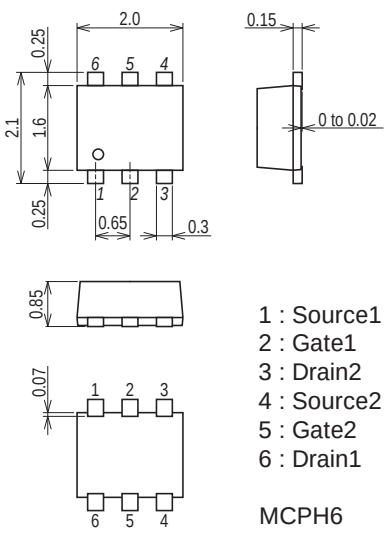
* Machine Model

Stresses exceeding Maximum Ratings may damage the device. Maximum Ratings are stress ratings only. Functional operation above the Recommended Operating Conditions is not implied. Extended exposure to stresses above the Recommended Operating Conditions may affect device reliability.

Package Dimensions

unit : mm (typ)

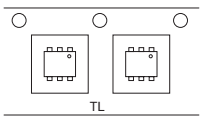
7022A-006



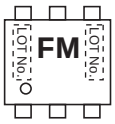
Ordering & Package Information

Device	Package	Shipping	memo
MCH6613-TL-E	MCPH6 SC-88, SC-70-6, SOT-363	3,000 pcs./reel	Pb-Free

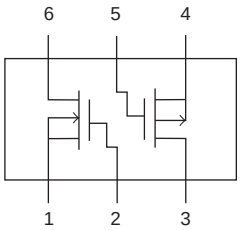
Packing Type : TL



Marking



Electrical Connection

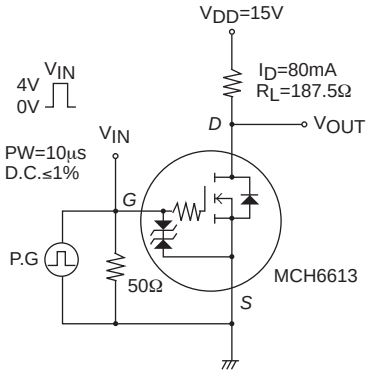


Electrical Characteristics at Ta=25°C

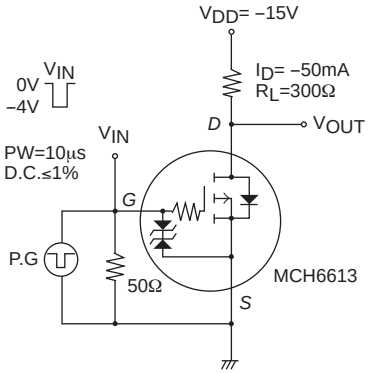
Parameter	Symbol	Conditions	Ratings			Unit
			min	typ	max	
[N-channel]						
Drain to Source Breakdown Voltage	$V_{(BR)DSS}$	I_D=1mA, V_{GS}=0V	30			V
Zero-Gate Voltage Drain Current	I_{DSS}	V_{DS}=30V, V_{GS}=0V			1	μA
Gate to Source Leakage Current	I_{GSS}	V_{GS}=±8V, V_{DS}=0V			±10	μA
Cutoff Voltage	V_{GS}(off)	V_{DS}=10V, I_D=100μA	0.4		1.3	V
Forward Transfer Admittance	| yfs |	V_{DS}=10V, I_D=80mA	150	220		mS
Static Drain to Source On-State Resistance	R_{DS}(on)1	I_D=80mA, V_{GS}=4V		2.9	3.7	Ω
	R_{DS}(on)2	I_D=40mA, V_{GS}=2.5V		3.7	5.2	Ω
	R_{DS}(on)3	I_D=10mA, V_{GS}=1.5V		6.4	12.8	Ω
Input Capacitance	Ciss	V_{DS}=10V, f=1MHz		7.0		pF
Output Capacitance	Coss			5.9		pF
Reverse Transfer Capacitance	Crss			2.3		pF
Turn-ON Delay Time	t_d(on)	See specified Test Circuit.		19		ns
Rise Time	t_r			65		ns
Turn-OFF Delay Time	t_d(off)			155		ns
Fall Time	t_f			120		ns
Total Gate Charge	Qg	V_{DS}=10V, V_{GS}=10V, I_D=150mA		1.58		nC
Gate to Source Charge	Qgs			0.26		nC
Gate to Drain “Miller” Charge	Qgd			0.31		nC
Diode Forward Voltage	V_{SD}	I_S=150mA, V_{GS}=0V		0.87	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}=±8V, V_{DS}=0V			±10	μA
Cutoff Voltage	V_{GS}(off)	V_{DS}=−10V, I_D=−100μA	−0.4		−1.4	V
Forward Transfer Admittance	| yfs |	V_{DS}=−10V, I_D=−50mA	80	110		mS
Static Drain to Source On-State Resistance	R_{DS}(on)1	I_D=−50mA, V_{GS}=−4V		8	10.4	Ω
	R_{DS}(on)2	I_D=−30mA, V_{GS}=−2.5V		11	15.4	Ω
	R_{DS}(on)3	I_D=−1mA, V_{GS}=−1.5V		27	54	Ω
Input Capacitance	Ciss	V_{DS}=−10V, f=1MHz		7.5		pF
Output Capacitance	Coss			5.7		pF
Reverse Transfer Capacitance	Crss			1.8		pF
Turn-ON Delay Time	t_d(on)	See specified Test Circuit.		24		ns
Rise Time	t_r			55		ns
Turn-OFF Delay Time	t_d(off)			120		ns
Fall Time	t_f			130		ns
Total Gate Charge	Qg	V_{DS}=−10V, V_{GS}=−10V, I_D=−100mA		1.43		nC
Gate to Source Charge	Qgs			0.18		nC
Gate to Drain “Miller” Charge	Qgd			0.25		nC
Diode Forward Voltage	V_{SD}	I_S=−100mA, V_{GS}=0V		−0.83	−1.2	V

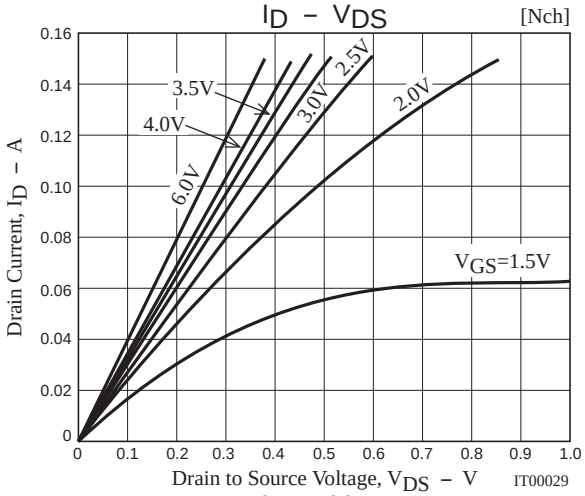
Switching Time Test Circuit

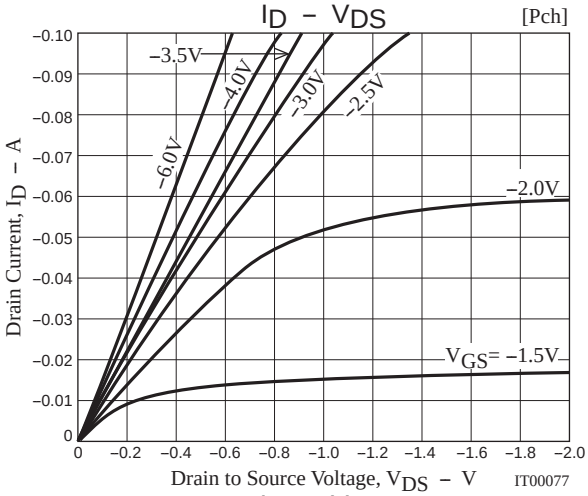
[N-channel]

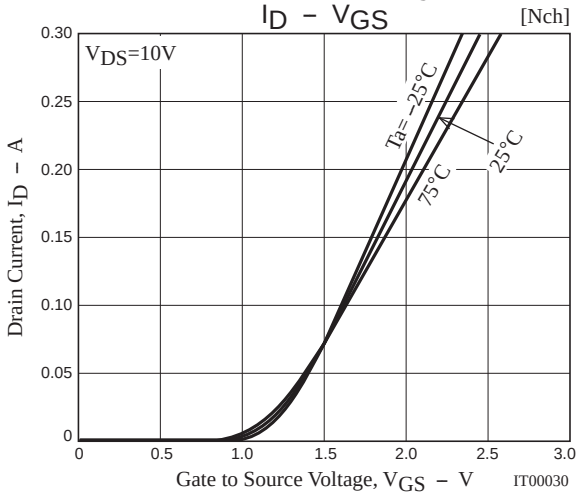


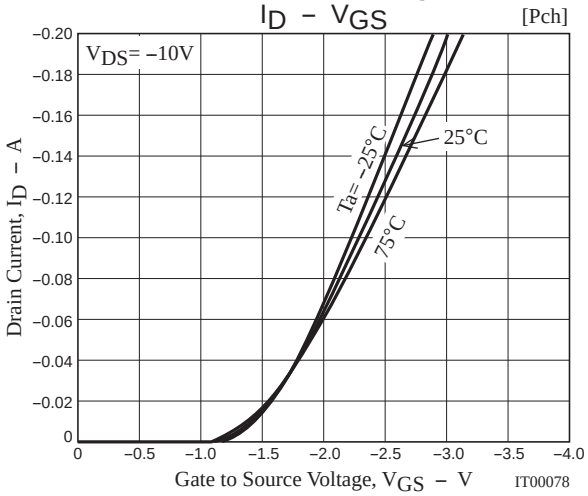
[P-channel]

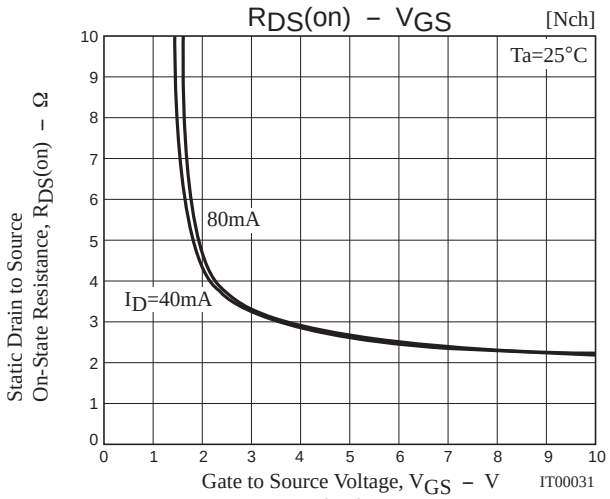


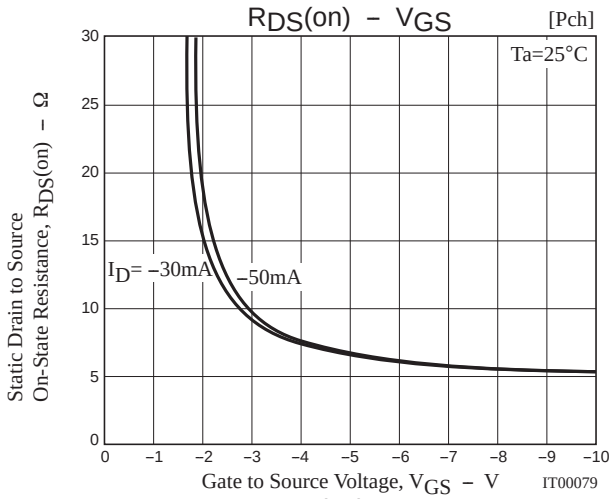


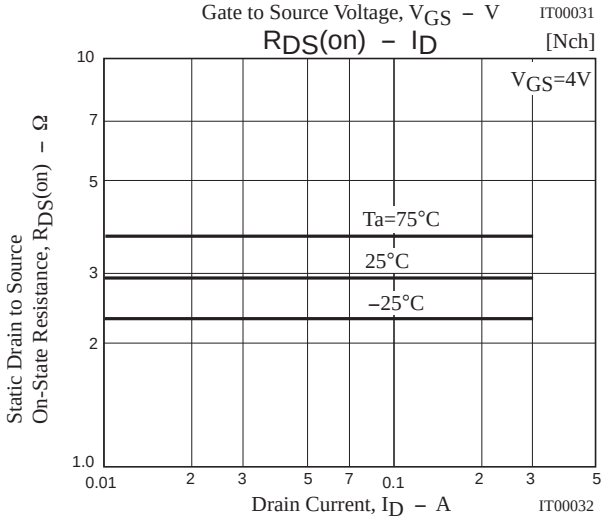


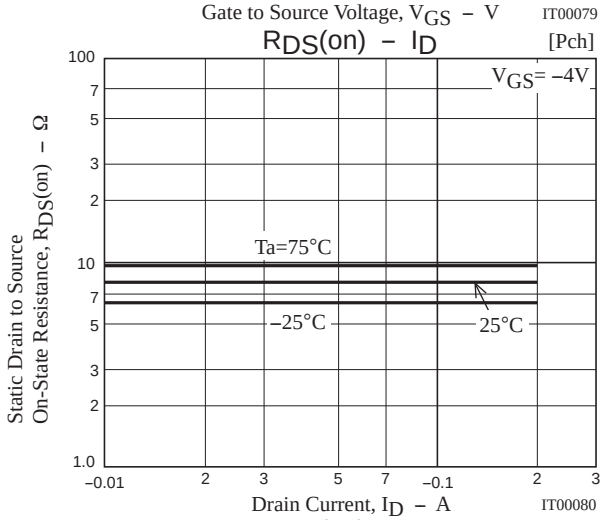


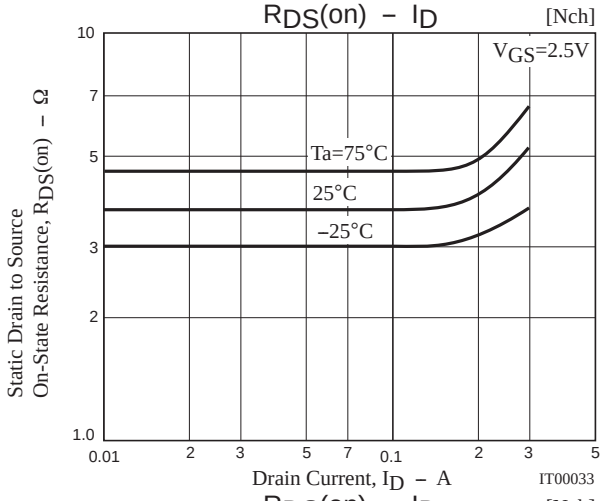


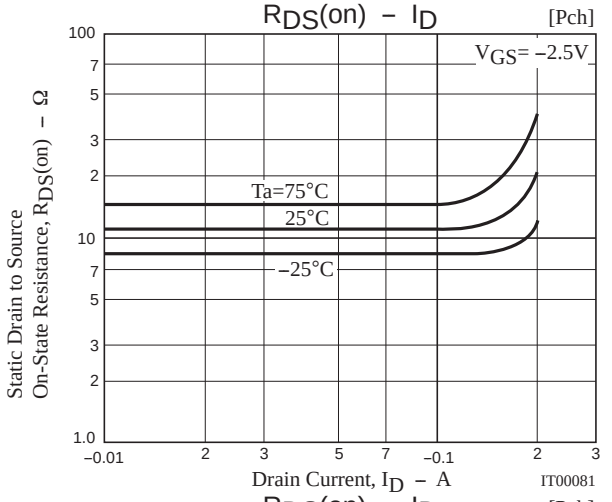

RDS(on) – VGS
[Nch]
Ta=25°C
80mA
ID=40mA
Static Drain to Source On-State Resistance, RDS(on) – Ω
Gate to Source Voltage, VGS – V
IT00031

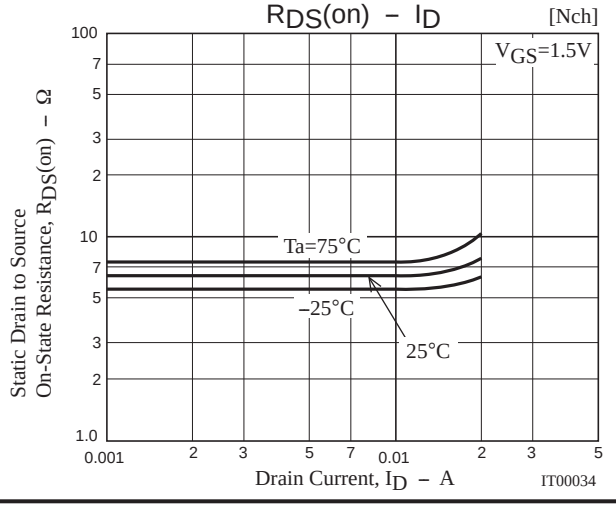

RDS(on) – VGS
[Pch]
Ta=25°C
ID= –30mA
–50mA
Static Drain to Source On-State Resistance, RDS(on) – Ω
Gate to Source Voltage, VGS – V
IT00079

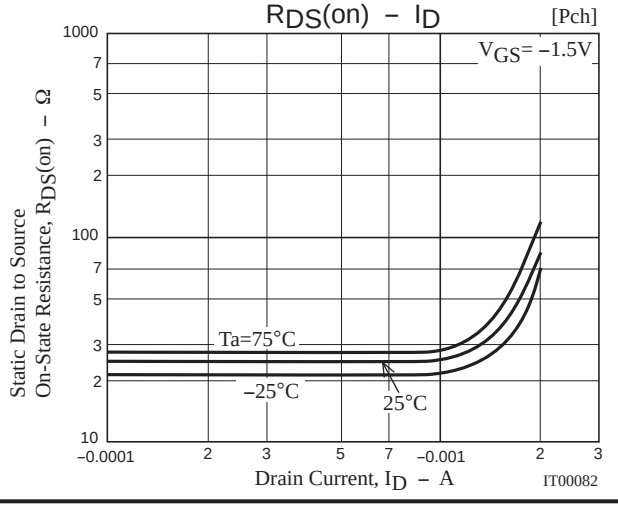

RDS(on) – ID
[Nch]
VGS=4V
Ta=75°C
25°C
–25°C
Static Drain to Source On-State Resistance, RDS(on) – Ω
Drain Current, ID – A
IT00032

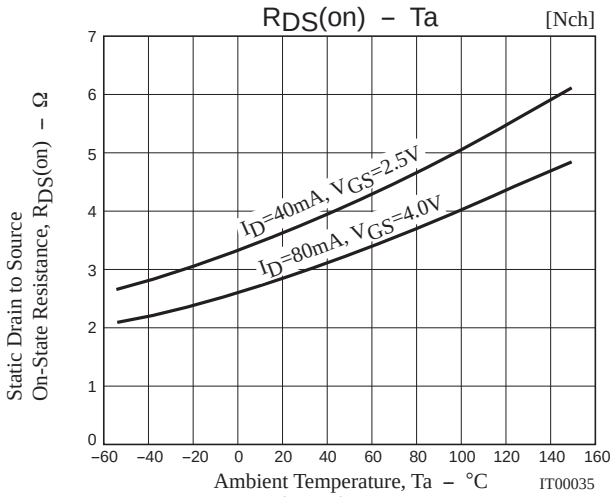

RDS(on) – ID
[Pch]
VGS= –4V
Ta=75°C
–25°C
25°C
Static Drain to Source On-State Resistance, RDS(on) – Ω
Drain Current, ID – A
IT00080

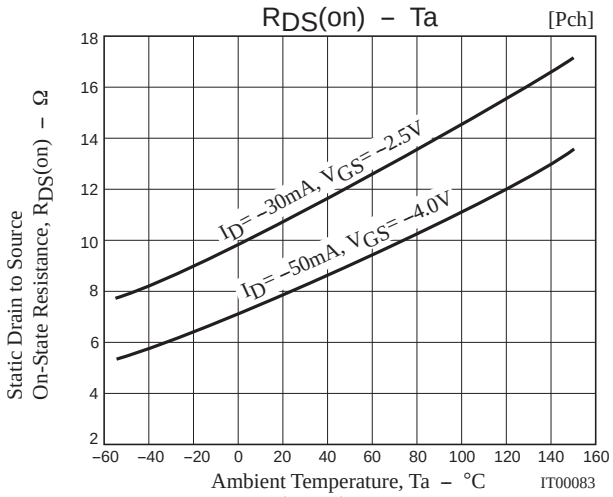

RDS(on) – ID
[Nch]
VGS=2.5V
Ta=75°C
25°C
–25°C
Static Drain to Source On-State Resistance, RDS(on) – Ω
Drain Current, ID – A
IT00033

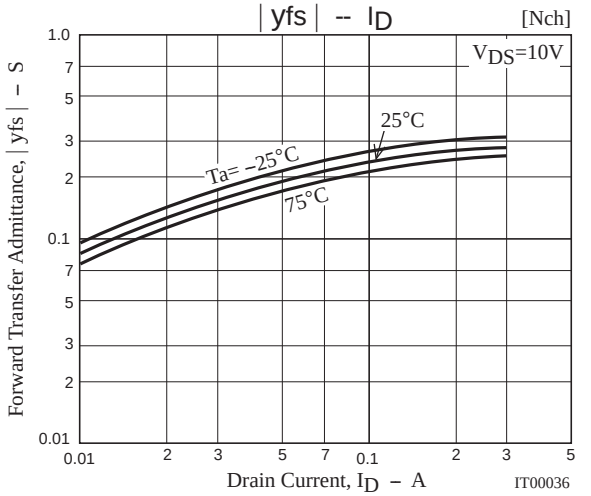

RDS(on) – ID
[Pch]
VGS= –2.5V
Ta=75°C
25°C
–25°C
Static Drain to Source On-State Resistance, RDS(on) – Ω
Drain Current, ID – A
IT00081

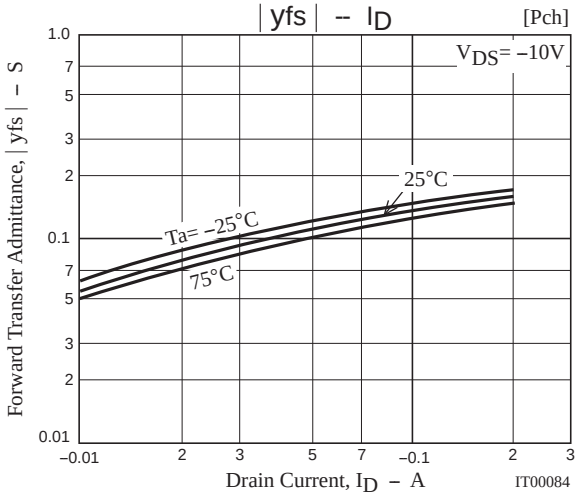

RDS(on) – ID
[Nch]
VGS=1.5V
Ta=75°C
–25°C
25°C
Static Drain to Source On-State Resistance, RDS(on) – Ω
Drain Current, ID – A
IT00034

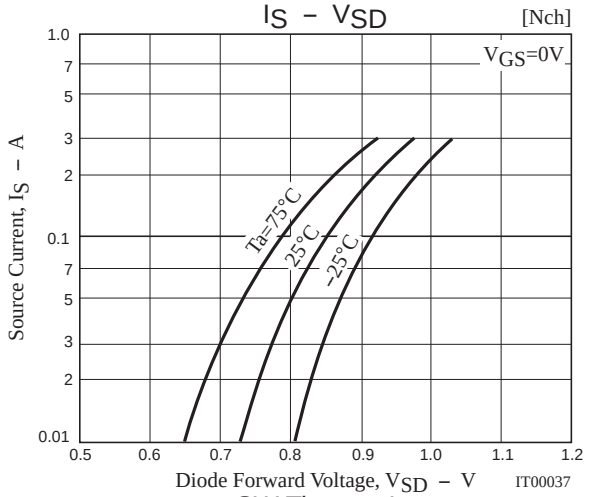

RDS(on) – ID
[Pch]
VGS= –1.5V
Ta=75°C
–25°C
25°C
Static Drain to Source On-State Resistance, RDS(on) – Ω
Drain Current, ID – A
IT00082

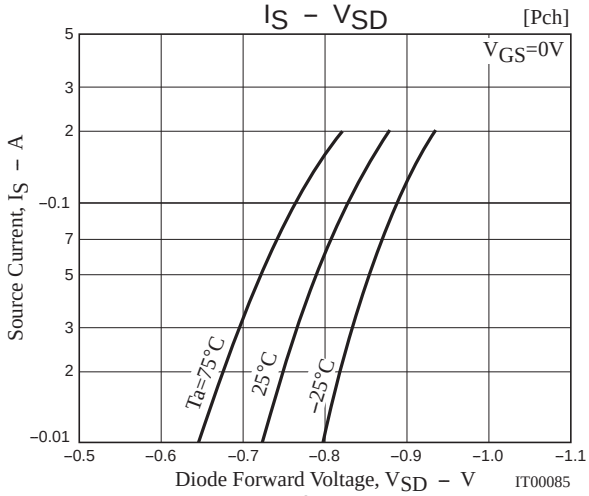

RDS(on) – Ta
[Nch]
Static Drain to Source On-State Resistance, RDS(on) – Ω
ID=40mA, VGS=2.5V
ID=80mA, VGS=4.0V
Ambient Temperature, Ta – °C
IT00035

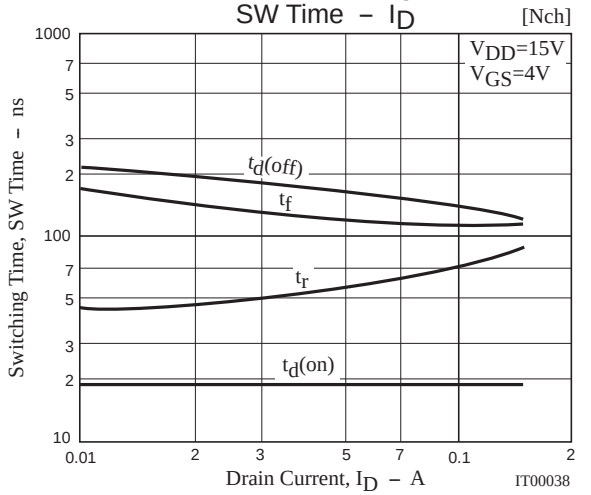

RDS(on) – Ta
[Pch]
Static Drain to Source On-State Resistance, RDS(on) – Ω
ID= –30mA, VGS= –2.5V
ID= –50mA, VGS= –4.0V
Ambient Temperature, Ta – °C
IT00083

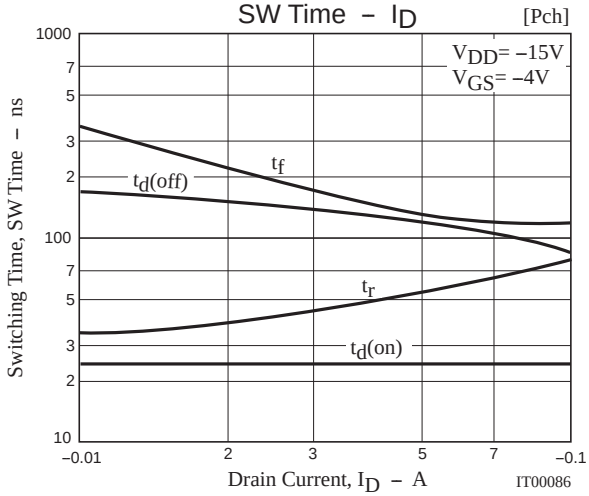

| yfs | -- ID
[Nch]
VDS=10V
Forward Transfer Admittance, | yfs | – S
25°C
Ta= –25°C
75°C
Drain Current, ID – A
IT00036

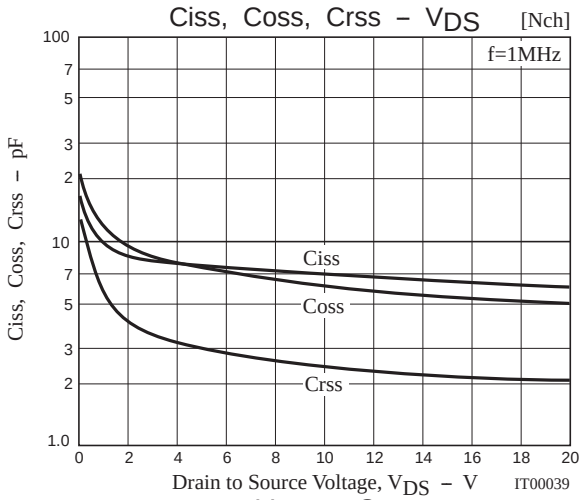

| yfs | -- ID
[Pch]
VDS= –10V
Forward Transfer Admittance, | yfs | – S
25°C
Ta= –25°C
75°C
Drain Current, ID – A
IT00084

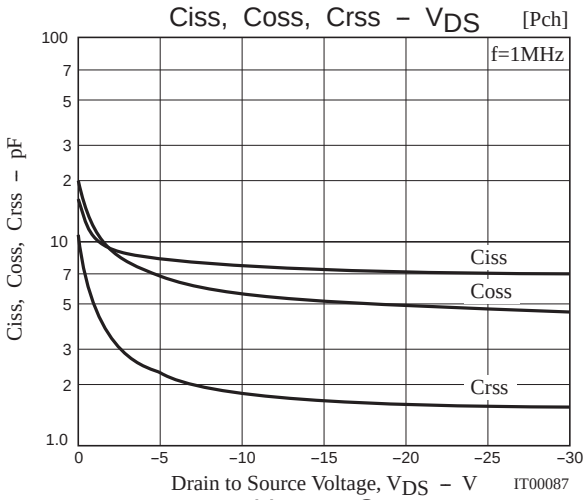

IS – VSD
[Nch]
VGS=0V
Source Current, IS – A
Ta=75°C
25°C
–25°C
Diode Forward Voltage, VSD – V
IT00037

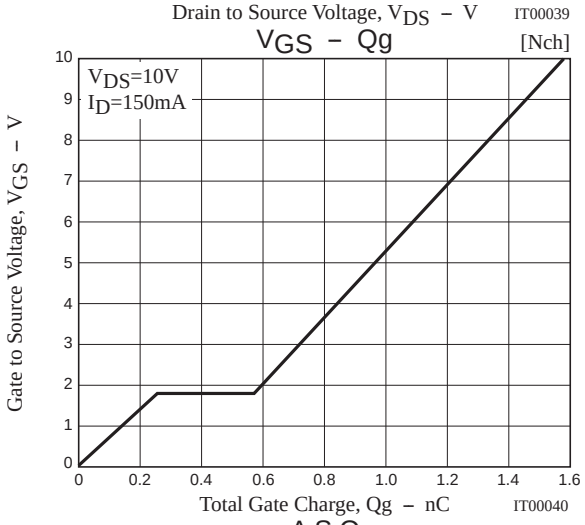

IS – VSD
[Pch]
VGS=0V
Source Current, IS – A
Ta=75°C
25°C
–25°C
Diode Forward Voltage, VSD – V
IT00085

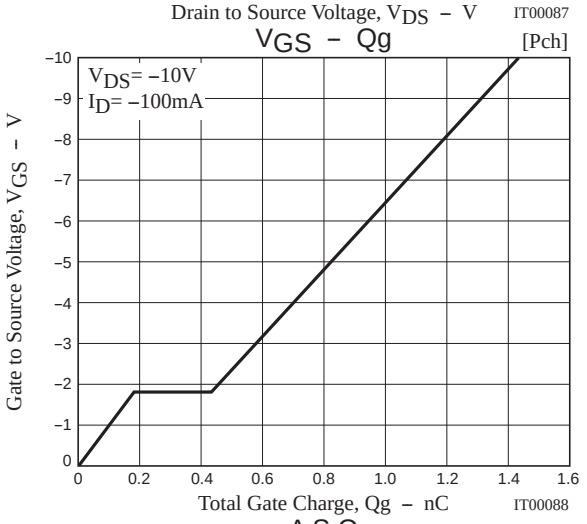

SW Time – ID
[Nch]
VDD=15V
VGS=4V
Switching Time, SW Time – ns
td(off)
tf
tr
td(on)
Drain Current, ID – A
IT00038

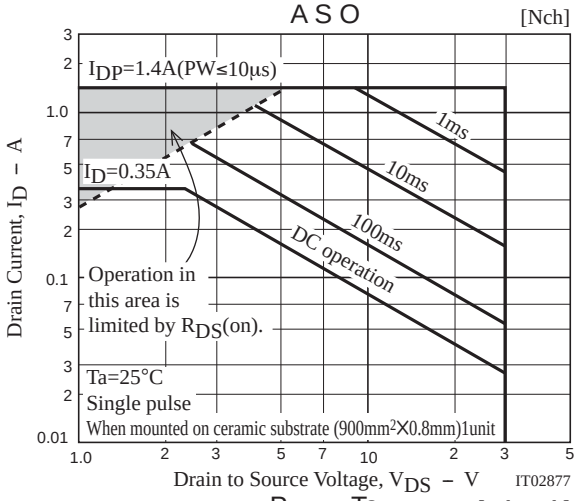

SW Time – ID
[Pch]
VDD= –15V
VGS= –4V
Switching Time, SW Time – ns
tf
td(off)
tr
td(on)
Drain Current, ID – A
IT00086

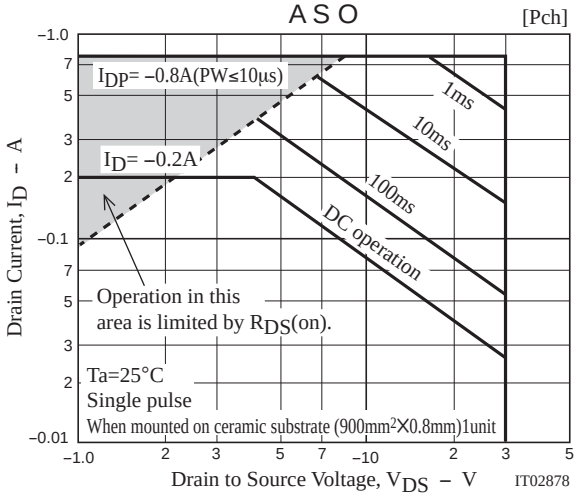

Ciss, Coss, Crss – VDS [Nch]
f=1MHz
Ciss
Coss
Crss
Ciss, Coss, Crss – pF
Drain to Source Voltage, VDS – V
IT00039

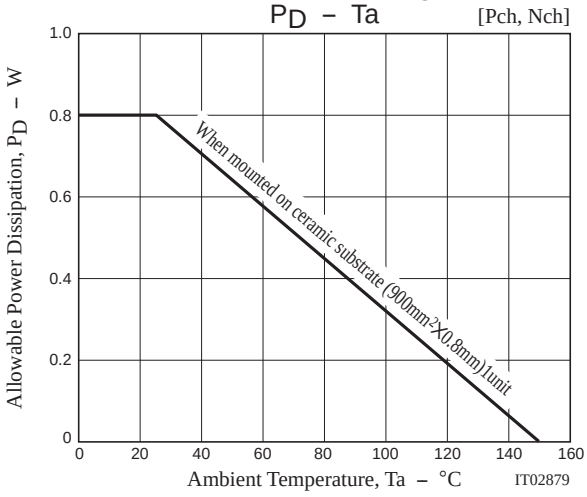

Ciss, Coss, Crss – VDS [Pch]
f=1MHz
Ciss
Coss
Crss
Ciss, Coss, Crss – pF
Drain to Source Voltage, VDS – V
IT00087


VGS – Qg [Nch]
VDS=10V
ID=150mA
Gate to Source Voltage, VGS – V
Total Gate Charge, Qg – nC
IT00040


VGS – Qg [Pch]
VDS= –10V
ID= –100mA
Gate to Source Voltage, VGS – V
Total Gate Charge, Qg – nC
IT00088

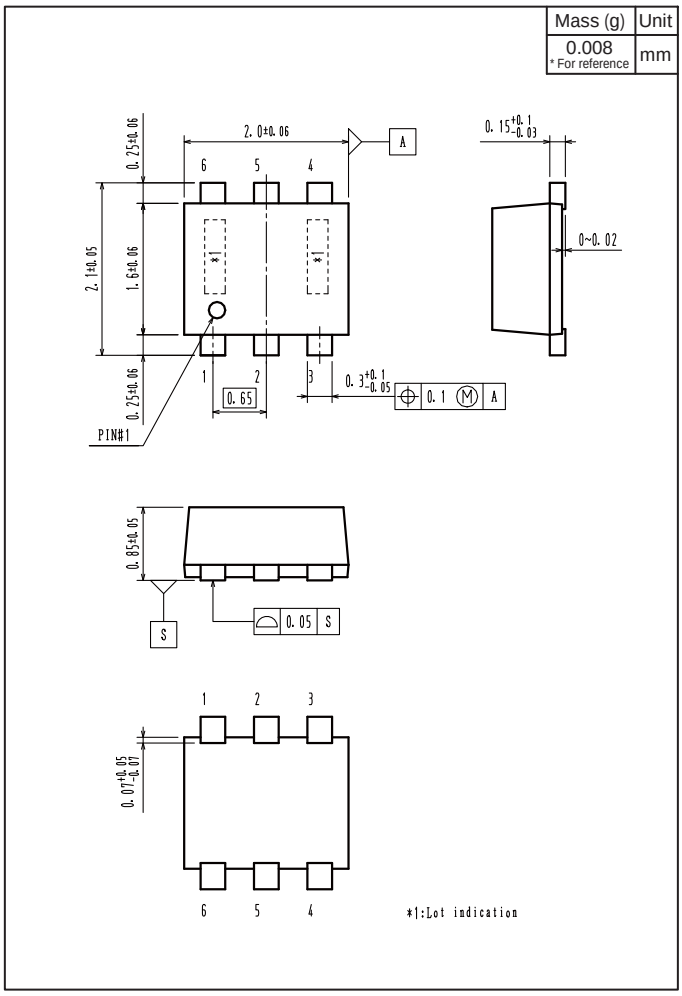

A S O [Nch]
IDP=1.4A(PW≤10μs)
ID=0.35A
1ms
10ms
100ms
DC operation
Operation in this area is limited by RDS(on).
Ta=25°C
Single pulse
When mounted on ceramic substrate (900mm2X0.8mm)1unit
Drain Current, ID – A
Drain to Source Voltage, VDS – V
IT02877


A S O [Pch]
IDP= –0.8A(PW≤10μs)
ID= –0.2A
1ms
10ms
100ms
DC operation
Operation in this area is limited by RDS(on).
Ta=25°C
Single pulse
When mounted on ceramic substrate (900mm2X0.8mm)1unit
Drain Current, ID – A
Drain to Source Voltage, VDS – V
IT02878

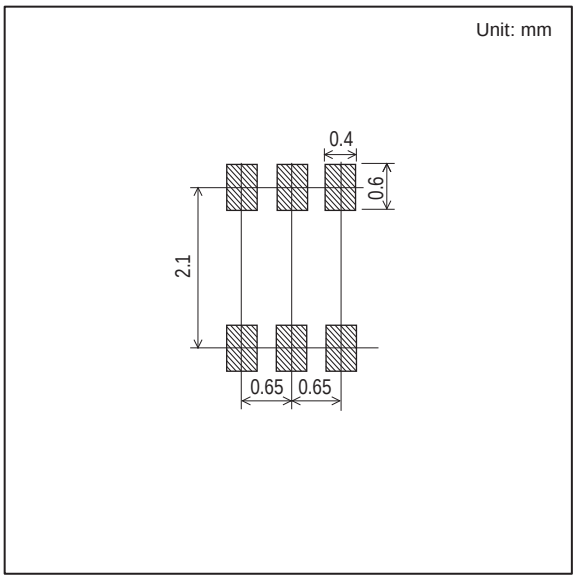

PD – Ta [Pch, Nch]
When mounted on ceramic substrate (900mm2X0.8mm)1unit
Allowable Power Dissipation, PD – W
Ambient Temperature, Ta – °C
IT02879

Outline Drawing

MCH6613-TL-E



Land Pattern Example



Note on usage : Since the MCH6613 is a MOSFET product, please avoid using this device in the vicinity of highly charged objects.