Ordering number : ENN6795

N-Channel and P-Channel Silicon MOSFET

MCH6614

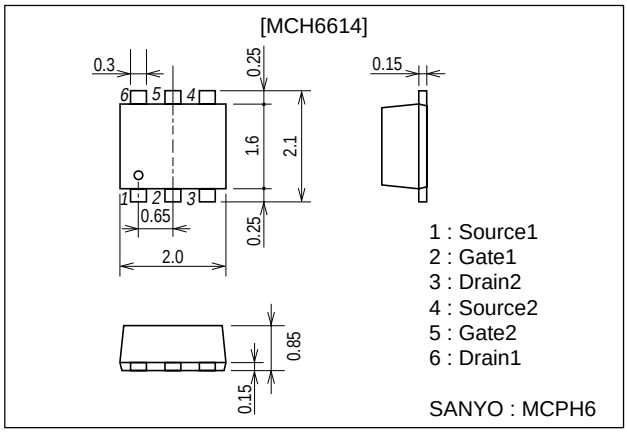
Ultrahigh-Speed Switching Applications

Features

- The MCH6614 incorporates two elements that are an N-channel and a P-channel MOSFETs that feature low ON resistance and high-speed switching, thereby enabling high-density mounting.
- Low ON-resistance.
- 2.5V drive.

Package Dimensions

unit : mm
2173



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	−0.4	A
Drain Current (Pulse)	I_{DP}	PW≤10μs, duty cycle≤1%	1.4	−1.6	A
Allowable Power Dissipation	P_D	Mounted on a ceramic board (900mm²X0.8mm)1unit	0.8		W
Channel Temperature	Tch		150		°C
Storage Temperature	Tstg		−55 to +150		°C

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}=0	30			V
Zero-Gate Voltage Drain Current	I_{DSS}	V_{DS}=30V, V_{GS}=0			10	μA
Gate-to-Source Leakage Current	I_{GSS}	V_{GS}=±8V, V_{DS}=0			±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

Marking : FN

Continued on next page.

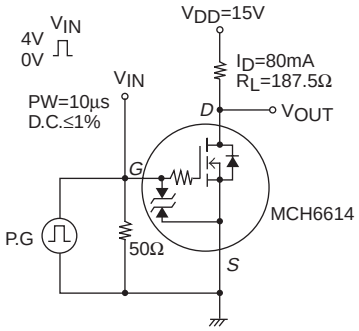
SANYO Electric Co.,Ltd. Semiconductor Company
TOKYO OFFICE Tokyo Bldg., 1-10, 1 Chome, Ueno, Taito-ku, TOKYO, 110-8534 JAPAN

Continued from preceding page.

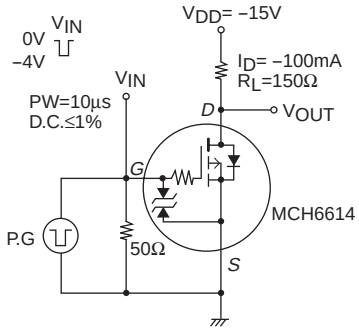
Parameter	Symbol	Conditions	Ratings			Unit
			min	typ	max	
Input Capacitance	Ciss	V_{DS}=10V, f=1MHz		7.0		pF
Output Capacitance	Coss	V_{DS}=10V, f=1MHz		5.9		pF
Reverse Transfer Capacitance	Crss	V_{DS}=10V, f=1MHz		2.3		pF
Turn-ON Delay Time	t_{d}(on)	See specified Test Circuit		19		ns
Rise Time	t_{r}	See specified Test Circuit		65		ns
Turn-OFF Delay Time	t_{d}(off)	See specified Test Circuit		155		ns
Fall Time	t_{f}	See specified Test Circuit		120		ns
Total Gate Charge	Qg	V_{DS}=10V, V_{GS}=10V, I_{D}=150mA		1.58		nC
Gate-to-Source Charge	Qgs	V_{DS}=10V, V_{GS}=10V, I_{D}=150mA		0.26		nC
Gate-to-Drain “Miller” Charge	Qgd	V_{DS}=10V, V_{GS}=10V, I_{D}=150mA		0.31		nC
Diode Forward Voltage	V_{SD}	I_{S}=150mA, V_{GS}=0		0.87	1.2	V
[P-channel]						
Drain-to-Source Breakdown Voltage	$V_{(BR)DSS}$	I_{D}=−1mA, V_{GS}=0	−30			V
Zero-Gate Voltage Drain Current	I_{DSS}	V_{DS}=−30V, V_{GS}=0			−10	μA
Gate-to-Source Leakage Current	I_{GSS}	V_{GS}=±8V, V_{DS}=0			±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}=−100mA	210	300		mS
Static Drain-to-Source On-State Resistance	R_{DS}(on)1	I_{D}=−100mA, V_{GS}=−4V		2.4	3.1	Ω
	R_{DS}(on)2	I_{D}=−50mA, V_{GS}=−2.5V		3.5	4.9	Ω
	R_{DS}(on)3	I_{D}=−10mA, V_{GS}=−1.5V		10	20	Ω
Input Capacitance	Ciss	V_{DS}=−10V, f=1MHz		28		pF
Output Capacitance	Coss	V_{DS}=−10V, f=1MHz		15		pF
Reverse Transfer Capacitance	Crss	V_{DS}=−10V, f=1MHz		5.2		pF
Turn-ON Delay Time	t_{d}(on)	See specified Test Circuit		24		ns
Rise Time	t_{r}	See specified Test Circuit		75		ns
Turn-OFF Delay Time	t_{d}(off)	See specified Test Circuit		200		ns
Fall Time	t_{f}	See specified Test Circuit		150		ns
Total Gate Charge	Qg	V_{DS}=−10V, V_{GS}=−10V, I_{D}=−200mA		2		nC
Gate-to-Source Charge	Qgs	V_{DS}=−10V, V_{GS}=−10V, I_{D}=−200mA		0.25		nC
Gate-to-Drain “Miller” Charge	Qgd	V_{DS}=−10V, V_{GS}=−10V, I_{D}=−200mA		0.35		nC
Diode Forward Voltage	V_{SD}	I_{S}=−200mA, V_{GS}=0		−0.82	−1.2	V

Switching Time Test Circuit

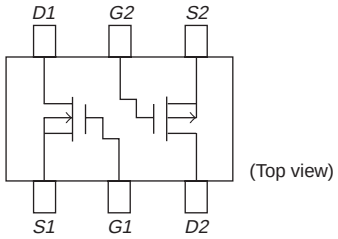
[N-channel]

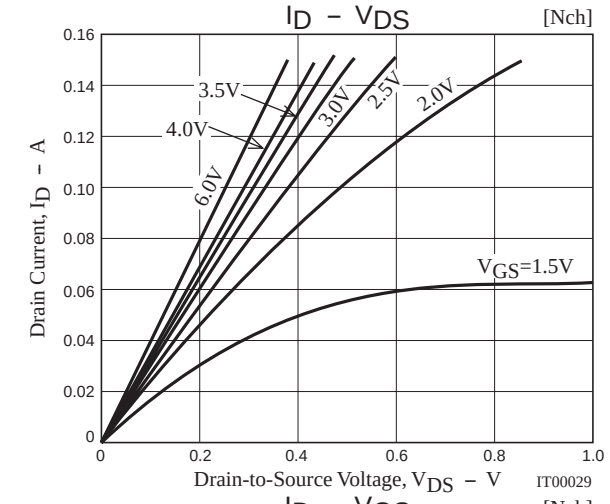


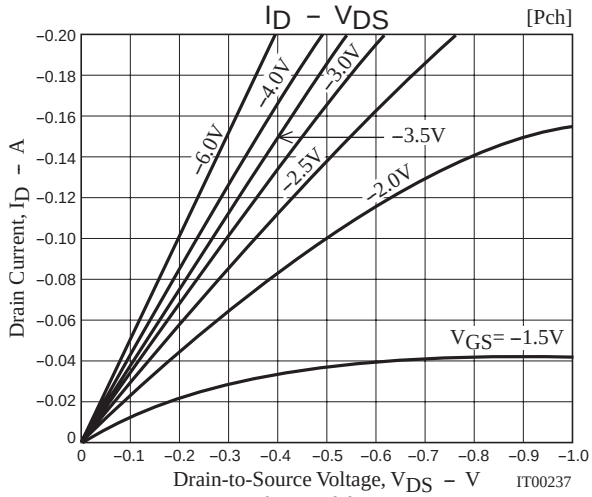
[P-channel]

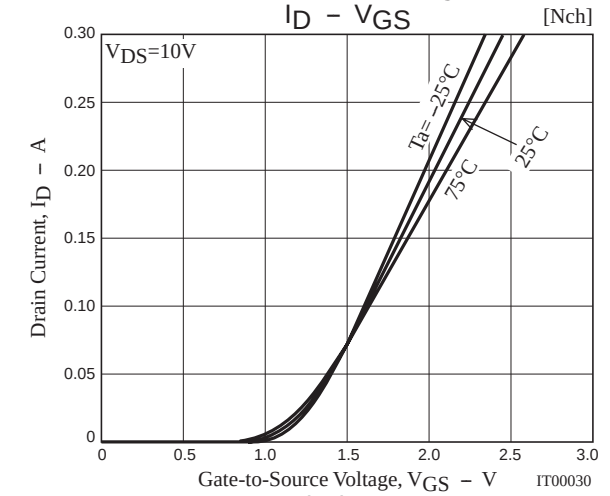


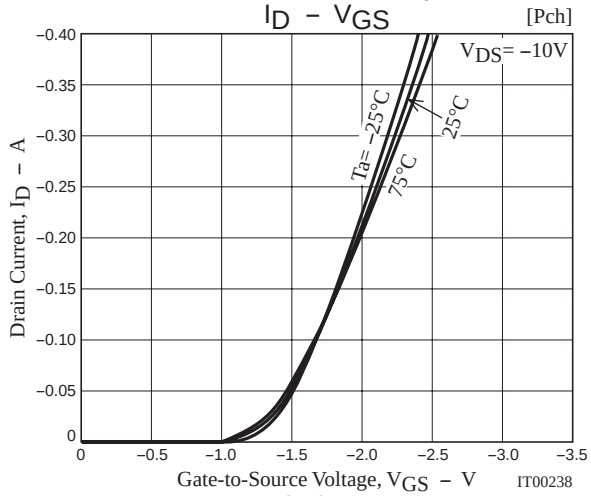
Electrical Connection

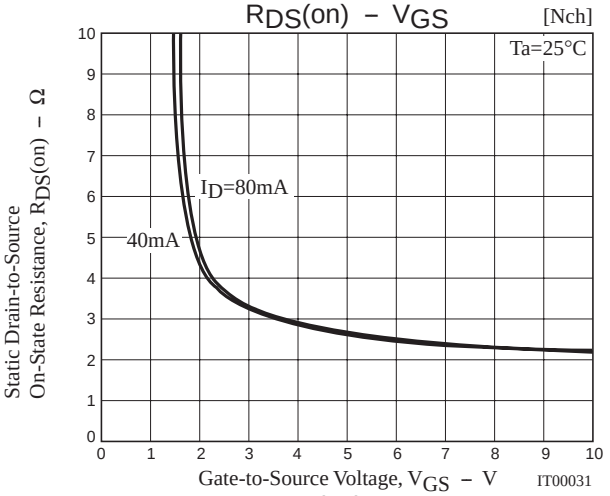


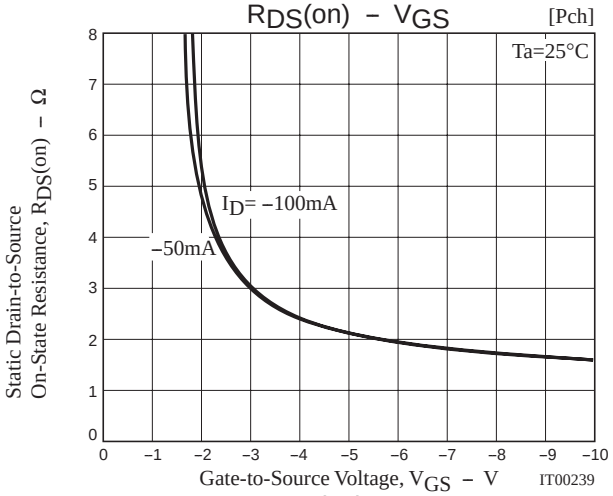

ID – VDS
[Nch]
Drain Current, ID – A
Drain-to-Source Voltage, VDS – V
IT00029
3.5V
4.0V
6.0V
3.0V
2.5V
2.0V
VGS=1.5V

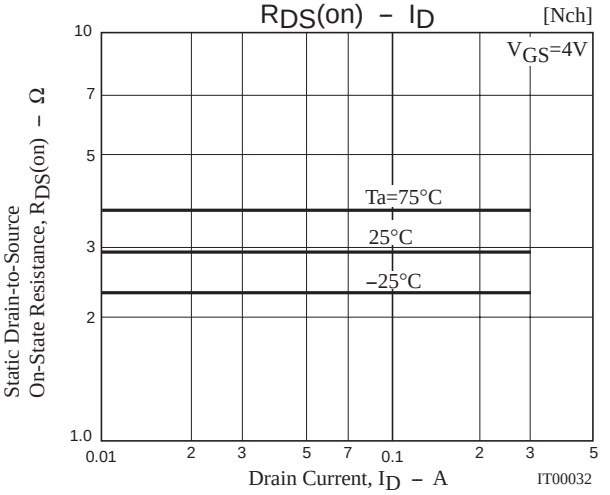

ID – VDS
[Pch]
Drain Current, ID – A
Drain-to-Source Voltage, VDS – V
IT00237
–4.0V
–6.0V
–3.0V
–3.5V
–2.5V
–2.0V
VGS= –1.5V

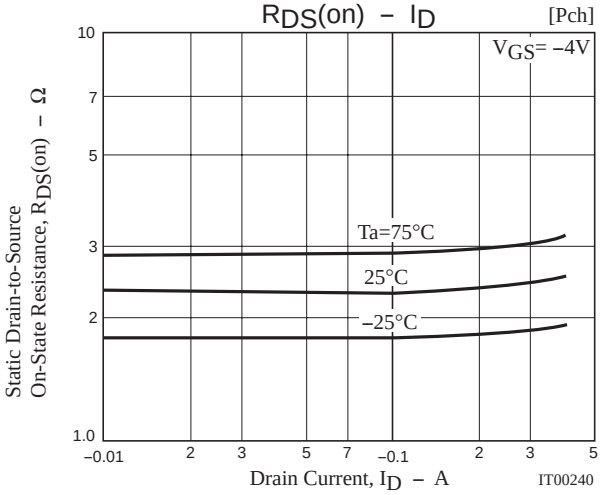

ID – VGS
[Nch]
Drain Current, ID – A
Gate-to-Source Voltage, VGS – V
IT00030
VDS=10V
Ta= –25°C
25°C
75°C

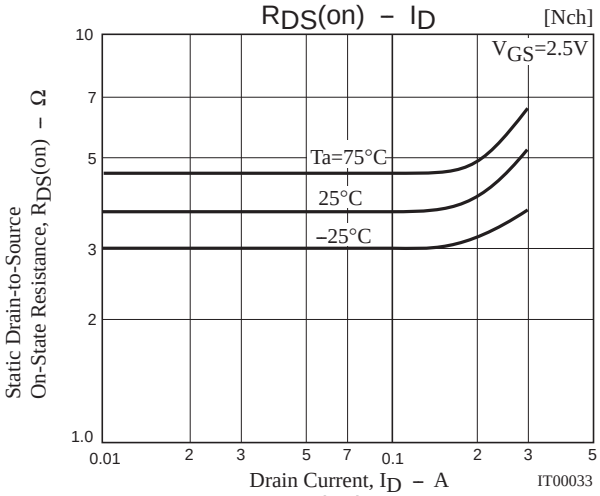

ID – VGS
[Pch]
Drain Current, ID – A
Gate-to-Source Voltage, VGS – V
IT00238
VDS= –10V
Ta= –25°C
25°C
75°C

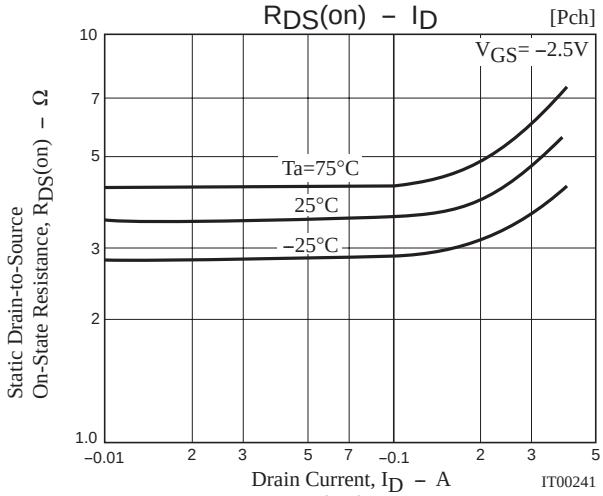

RDS(on) – VGS
[Nch]
Static Drain-to-Source On-State Resistance, RDS(on) – Ω
Gate-to-Source Voltage, VGS – V
IT00031
Ta=25°C
ID=80mA
40mA

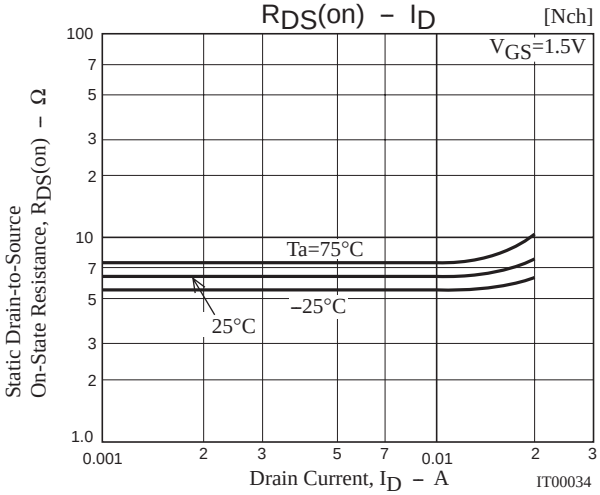

RDS(on) – VGS
[Pch]
Static Drain-to-Source On-State Resistance, RDS(on) – Ω
Gate-to-Source Voltage, VGS – V
IT00239
Ta=25°C
ID= –100mA
–50mA

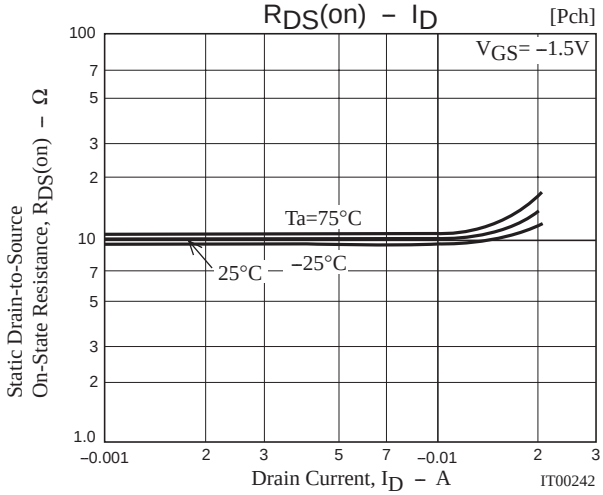

RDS(on) – ID
[Nch]
Static Drain-to-Source On-State Resistance, RDS(on) – Ω
Drain Current, ID – A
IT00032
VGS=4V
Ta=75°C
25°C
–25°C

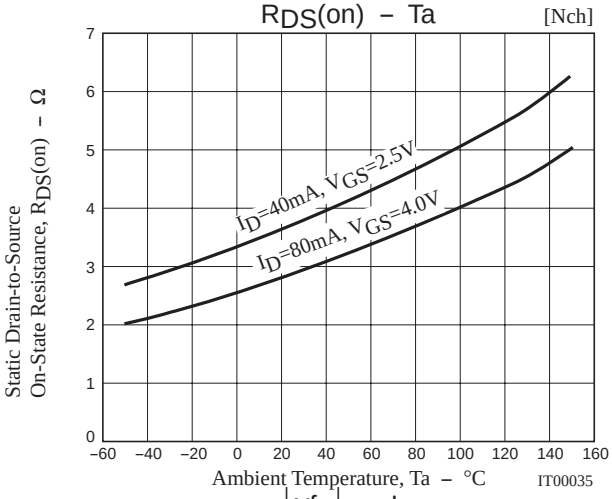

RDS(on) – ID
[Pch]
Static Drain-to-Source On-State Resistance, RDS(on) – Ω
Drain Current, ID – A
IT00240
VGS= –4V
Ta=75°C
25°C
–25°C

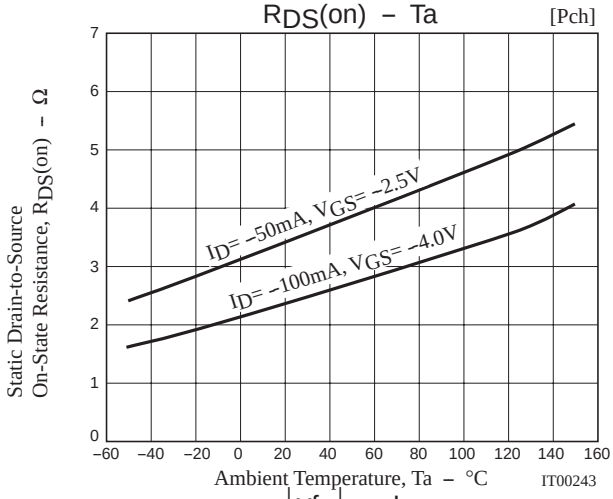

RDS(on) – ID
[Nch]
VGS=2.5V
Ta=75°C
25°C
–25°C
Static Drain-to-Source On-State Resistance, RDS(on) – Ω
Drain Current, ID – A
IT00033

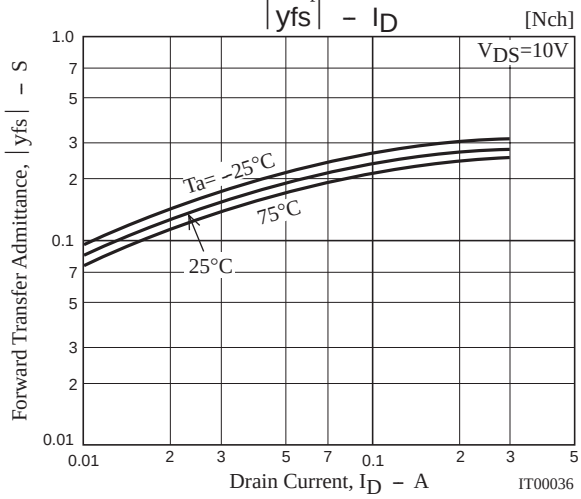

RDS(on) – ID
[Pch]
VGS= –2.5V
Ta=75°C
25°C
–25°C
Static Drain-to-Source On-State Resistance, RDS(on) – Ω
Drain Current, ID – A
IT00241

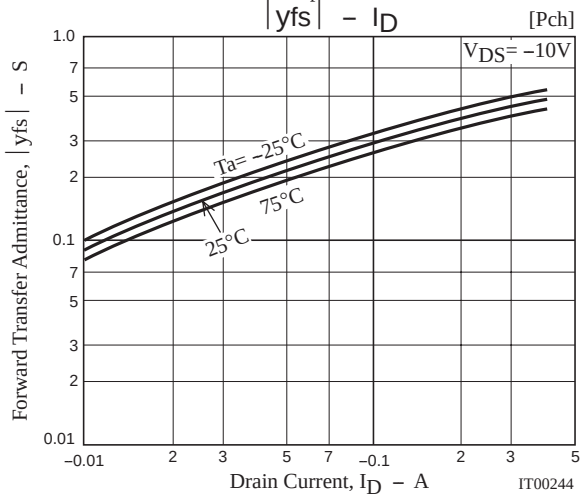

RDS(on) – ID
[Nch]
VGS=1.5V
Ta=75°C
25°C
–25°C
Static Drain-to-Source On-State Resistance, RDS(on) – Ω
Drain Current, ID – A
IT00034

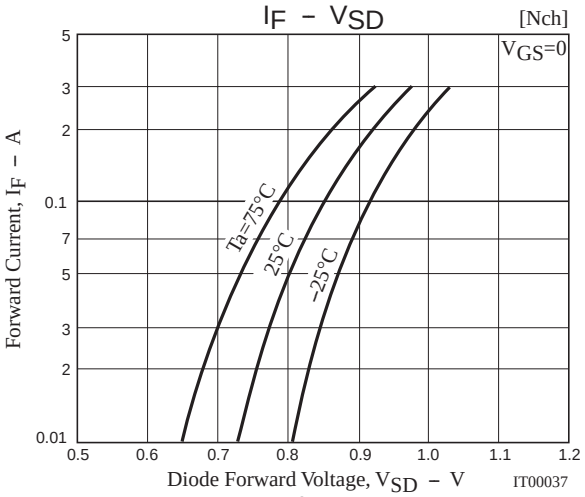

RDS(on) – ID
[Pch]
VGS= –1.5V
Ta=75°C
25°C
–25°C
Static Drain-to-Source On-State Resistance, RDS(on) – Ω
Drain Current, ID – A
IT00242

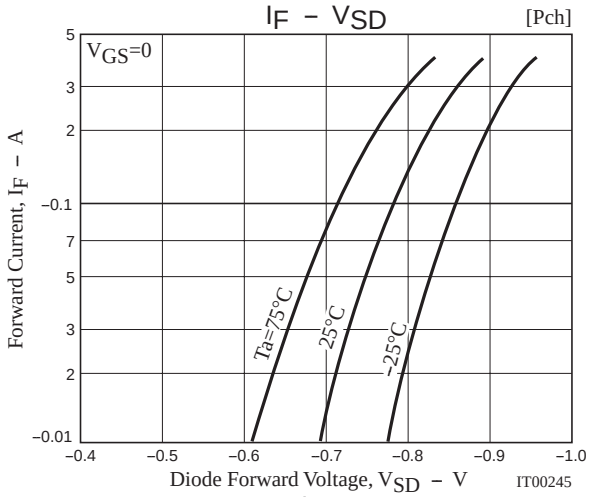

RDS(on) – Ta
[Nch]
ID=40mA, VGS=2.5V
ID=80mA, VGS=4.0V
Static Drain-to-Source On-State Resistance, RDS(on) – Ω
Ambient Temperature, Ta – °C
IT00035

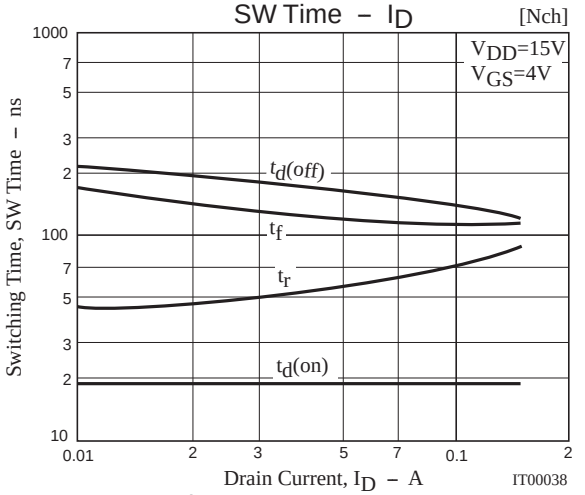

RDS(on) – Ta
[Pch]
ID= –50mA, VGS= –2.5V
ID= –100mA, VGS= –4.0V
Static Drain-to-Source On-State Resistance, RDS(on) – Ω
Ambient Temperature, Ta – °C
IT00243

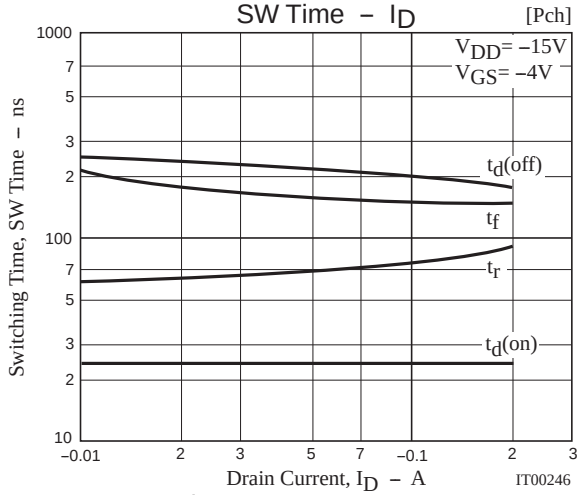

|yfs| – ID
[Nch]
VDS=10V
Ta= –25°C
75°C
25°C
Forward Transfer Admittance, |yfs| – S
Drain Current, ID – A
IT00036

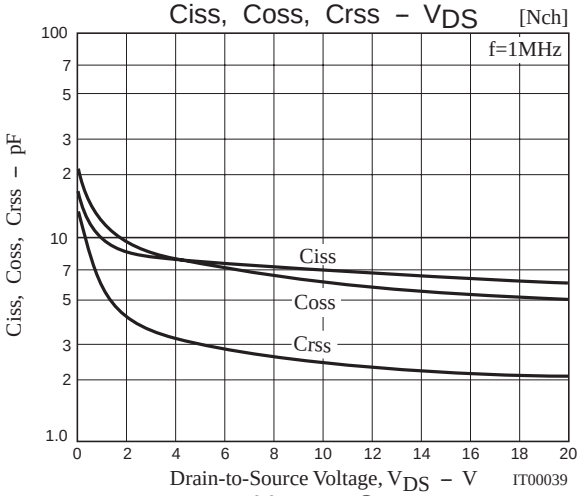

|yfs| – ID
[Pch]
VDS= –10V
Ta= –25°C
75°C
25°C
Forward Transfer Admittance, |yfs| – S
Drain Current, ID – A
IT00244

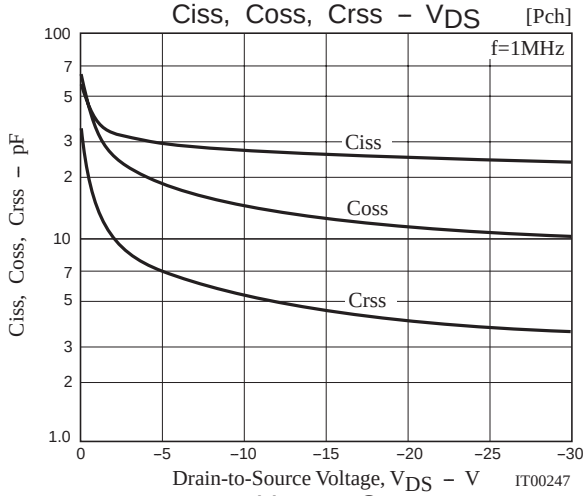

IF – VSD
[Nch]
VGS=0
Forward Current, IF – A
Ta=75°C
25°C
–25°C
Diode Forward Voltage, VSD – V
IT00037

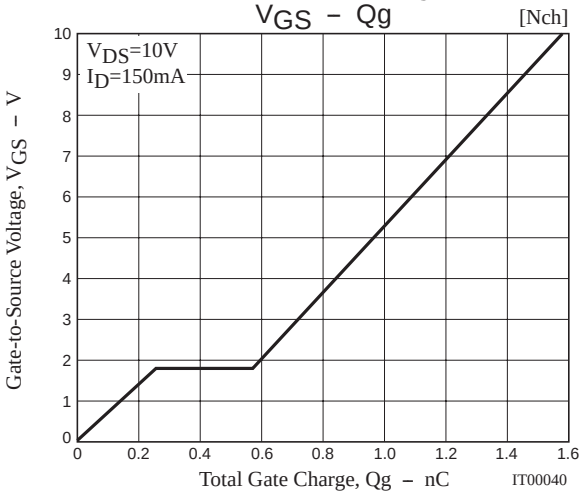

IF – VSD
[Pch]
VGS=0
Forward Current, IF – A
Ta=75°C
25°C
–25°C
Diode Forward Voltage, VSD – V
IT00245

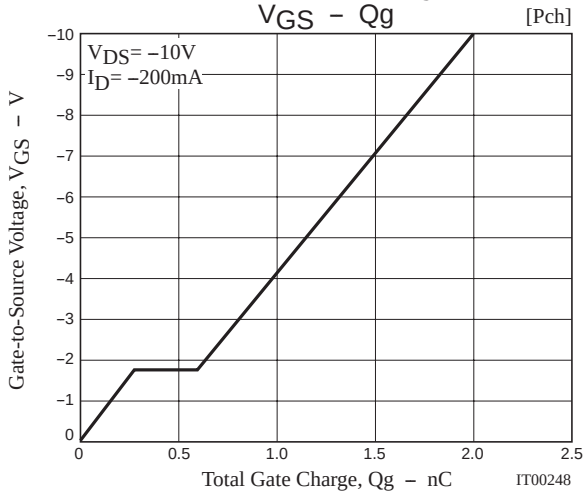

SW Time – ID
[Nch]
VDD=15V
VGS=4V
Switching Time, SW Time – ns
td(off)
tf
tr
td(on)
Drain Current, ID – A
IT00038

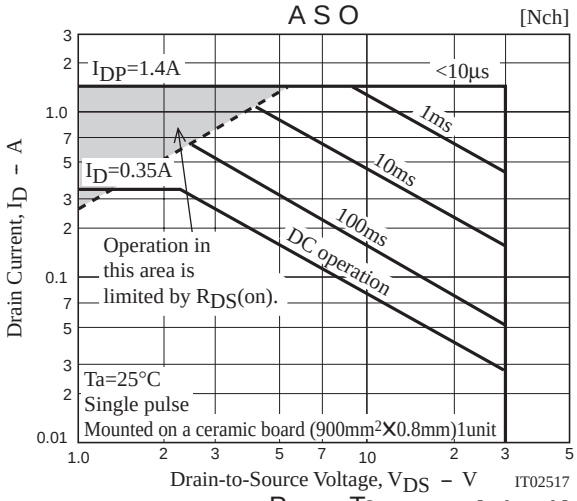

SW Time – ID
[Pch]
VDD= –15V
VGS= –4V
Switching Time, SW Time – ns
td(off)
tf
tr
td(on)
Drain Current, ID – A
IT00246

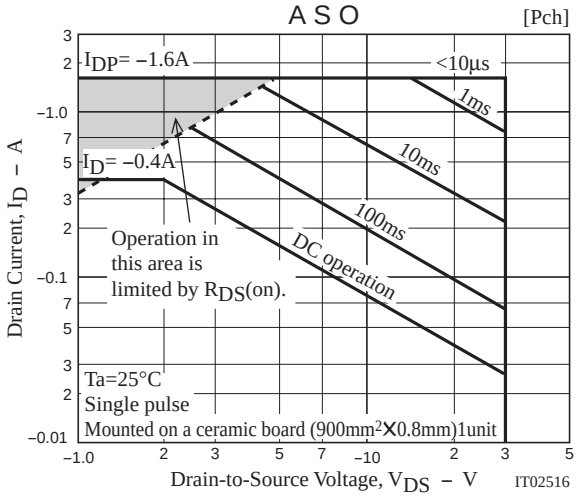

Ciss, Coss, Crss – VDS
[Nch]
f=1MHz
Ciss, Coss, Crss – pF
Ciss
Coss
Crss
Drain-to-Source Voltage, VDS – V
IT00039

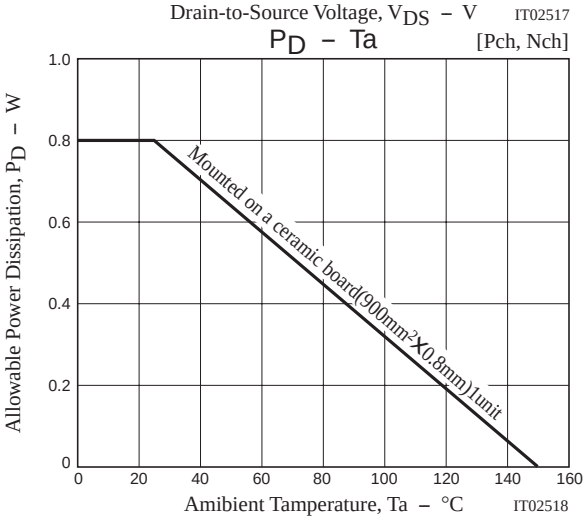

Ciss, Coss, Crss – VDS
[Pch]
f=1MHz
Ciss, Coss, Crss – pF
Ciss
Coss
Crss
Drain-to-Source Voltage, VDS – V
IT00247


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= –200mA
Gate-to-Source Voltage, VGS – V
Total Gate Charge, Qg – nC
IT00248







Note on usage : Since the MCH6614 is designed for high-speed switching applications, please avoid using this device in the vicinity of highly charged objects.