Ordering number : ENA0658

SANYO Semiconductors

DATA SHEET

N-Channel and P-Channel Silicon MOSFETs

ECH8619 — General-Purpose Switching Device Applications

Features

- The ECH8619 incorporates an N-channel MOSFET and a P-channel MOSFET that feature low ON-resistance and ultrahigh-speed switching, thereby enabling high-density mounting.
- 4V drive.

Specifications

Absolute Maximum Ratings at Ta=25°C

Parameter	Symbol	Conditions	N-channel	P-channel	Unit
Drain-to-Source Voltage	V_{DSS}		60	−60	V
Gate-to-Source Voltage	V_{GSS}		±20	±20	V
Drain Current (DC)	I_D		3	−2	A
Drain Current (Pulse)	I_{DP}	PW≤10μs, duty cycle≤1%	20	−20	A
Allowable Power Dissipation	P_D	Mounted on a ceramic board (900mm²X0.8mm) 1unit	1.3		W
Total Dissipation	P_T	Mounted on a ceramic board (900mm²X0.8mm)	1.5		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}=0V	60			V
Zero-Gate Voltage Drain Current	I_{DSS}	V_{DS}=60V, V_{GS}=0V			1	μA
Gate-to-Source Leakage Current	I_{GSS}	V_{GS}=±16V, V_{DS}=0V			±10	μA
Cutoff Voltage	$V_{GS}(off)$	V_{DS}=10V, I_D=1mA	1.2		2.6	V
Forward Transfer Admittance	$\|yfs\|$	V_{DS}=10V, I_D=1.5A	2.2	3.8		S
Static Drain-to-Source On-State Resistance	$R_{DS}(on)1$	I_D=1.5A, V_{GS}=10V		70	93	mΩ
	$R_{DS}(on)2$	I_D=0.5A, V_{GS}=4V		92	133	mΩ

Marking : FM

Continued on next page.

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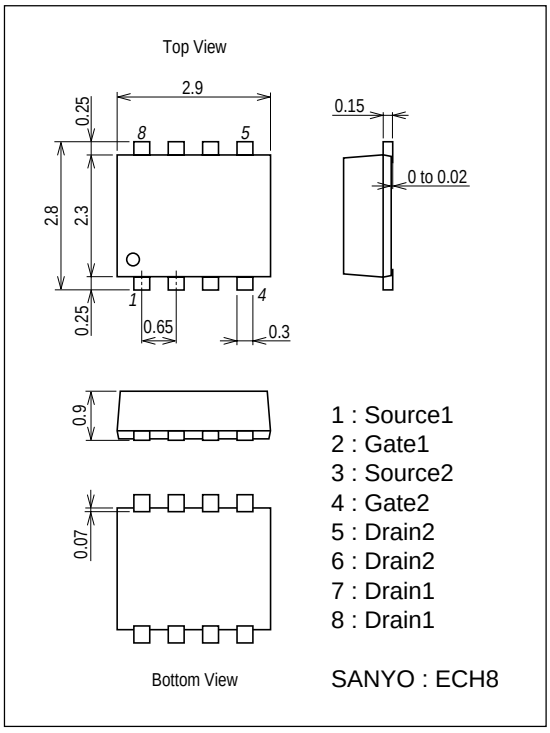
Parameter	Symbol	Conditions	Ratings			Unit
			min	typ	max	
Input Capacitance	Ciss	V_{DS}=20V, f=1MHz		560		pF
Output Capacitance	Coss	V_{DS}=20V, f=1MHz		60		pF
Reverse Transfer Capacitance	Crss	V_{DS}=20V, f=1MHz		41		pF
Turn-ON Delay Time	t_{d}(on)	See specified Test Circuit.		11		ns
Rise Time	t_{r}	See specified Test Circuit.		11		ns
Turn-OFF Delay Time	t_{d}(off)	See specified Test Circuit.		61		ns
Fall Time	t_{f}	See specified Test Circuit.		32		ns
Total Gate Charge	Qg	V_{DS}=30V, V_{GS}=10V, I_{D}=3A		12.8		nC
Gate-to-Source Charge	Qgs	V_{DS}=30V, V_{GS}=10V, I_{D}=3A		2.1		nC
Gate-to-Drain “Miller” Charge	Qgd	V_{DS}=30V, V_{GS}=10V, I_{D}=3A		2.7		nC
Diode Forward Voltage	V_{SD}	I_{S}=3A, V_{GS}=0V		0.81	1.2	V
[P-channel]						
Drain-to-Source Breakdown Voltage	$V_{(BR)DSS}$	I_{D}=−1mA, V_{GS}=0V	−60			V
Zero-Gate Voltage Drain Current	I_{DSS}	V_{DS}=−60V, V_{GS}=0V			−1	μA
Gate-to-Source Leakage Current	I_{GSS}	V_{GS}=±16V, V_{DS}=0V			±10	μA
Cutoff Voltage	V_{GS}(off)	V_{DS}=−10V, I_{D}=−1mA	−1.2		−2.6	V
Forward Transfer Admittance	|yfs|	V_{DS}=−10V, I_{D}=−1A	2.1	3.5		S
Static Drain-to-Source On-State Resistance	R_{DS}(on)1	I_{D}=−1A, V_{GS}=−10V		160	210	mΩ
	R_{DS}(on)2	I_{D}=−0.5A, V_{GS}=−4V		210	295	mΩ
Input Capacitance	Ciss	V_{DS}=−20V, f=1MHz		660		pF
Output Capacitance	Coss	V_{DS}=−20V, f=1MHz		54		pF
Reverse Transfer Capacitance	Crss	V_{DS}=−20V, f=1MHz		42		pF
Turn-ON Delay Time	t_{d}(on)	See specified Test Circuit.		10.5		ns
Rise Time	t_{r}	See specified Test Circuit.		7.0		ns
Turn-OFF Delay Time	t_{d}(off)	See specified Test Circuit.		93		ns
Fall Time	t_{f}	See specified Test Circuit.		30		ns
Total Gate Charge	Qg	V_{DS}=−30V, V_{GS}=−10V, I_{D}=−2A		15		nC
Gate-to-Source Charge	Qgs	V_{DS}=−30V, V_{GS}=−10V, I_{D}=−2A		2.1		nC
Gate-to-Drain “Miller” Charge	Qgd	V_{DS}=−30V, V_{GS}=−10V, I_{D}=−2A		2.7		nC
Diode Forward Voltage	V_{SD}	I_{S}=−2A, V_{GS}=0V		−0.82	−1.2	V

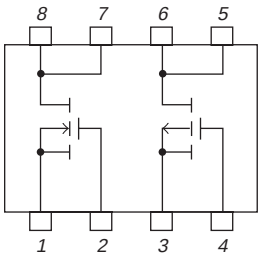
Package Dimensions

unit : mm (typ)

7011A-001



Electrical Connection

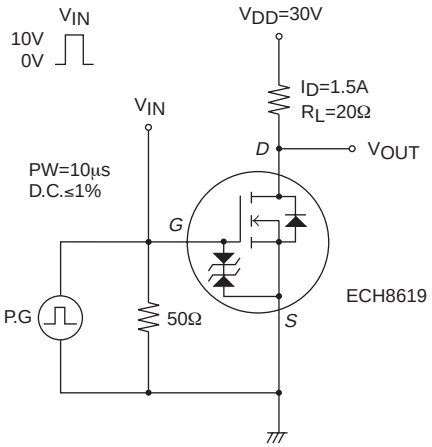


1 : Source1
2 : Gate1
3 : Source2
4 : Gate2
5 : Drain2
6 : Drain2
7 : Drain1
8 : Drain1

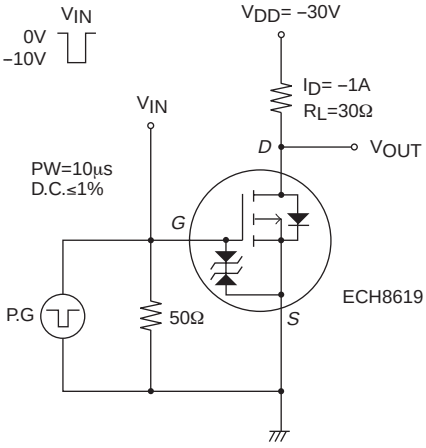
Top view

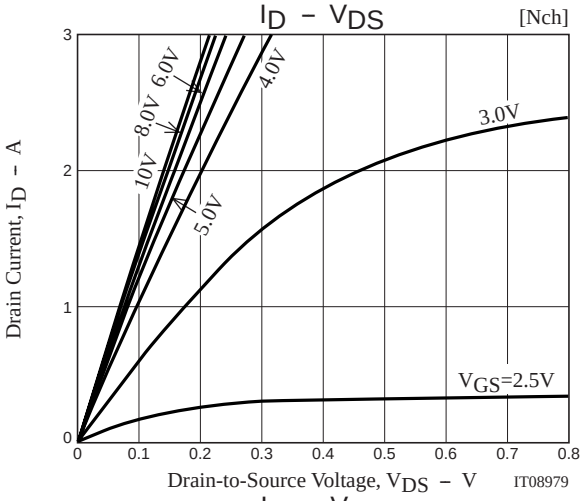
Switching Time Test Circuit

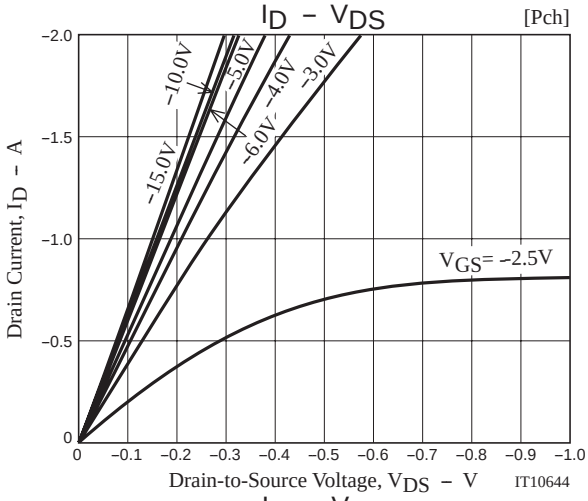
[N-channel]

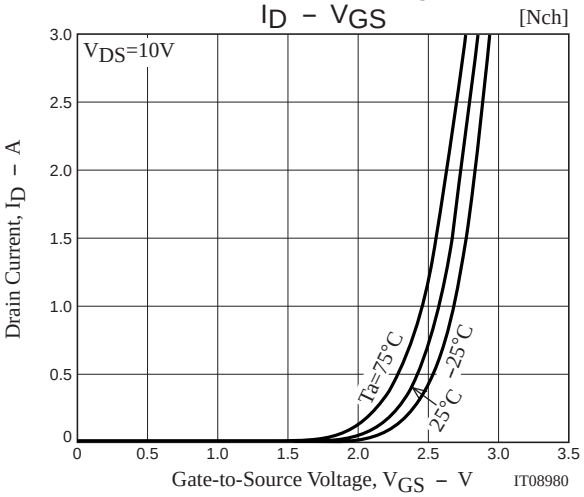


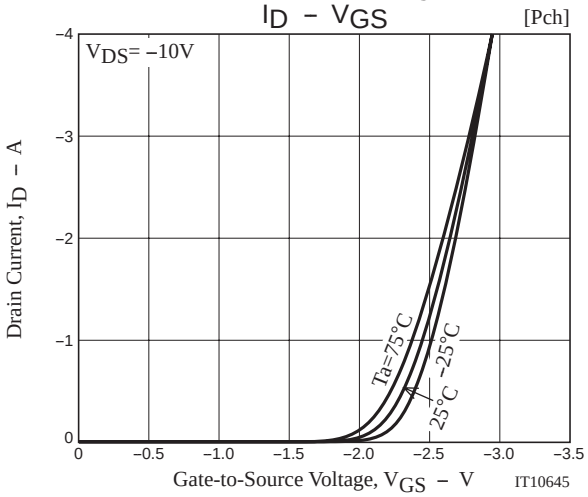
[P-channel]

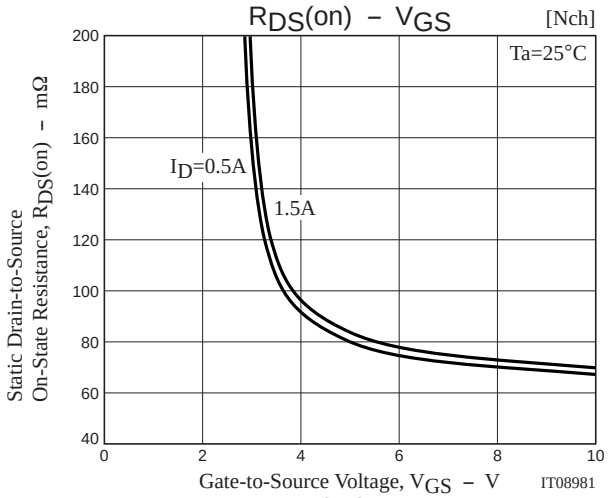


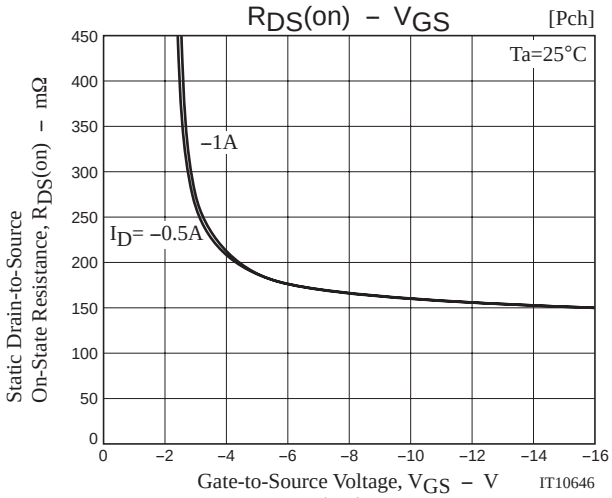


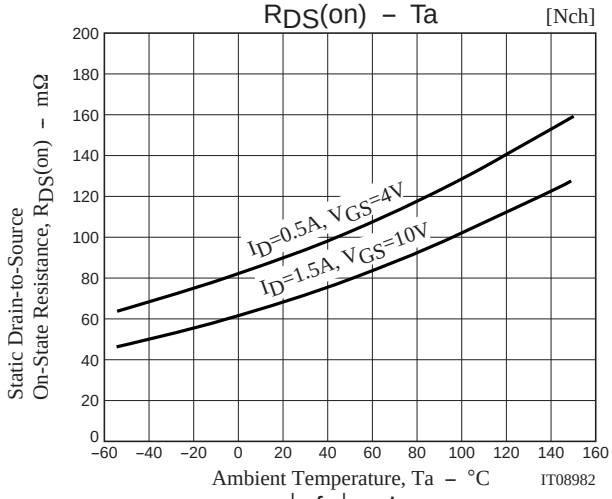


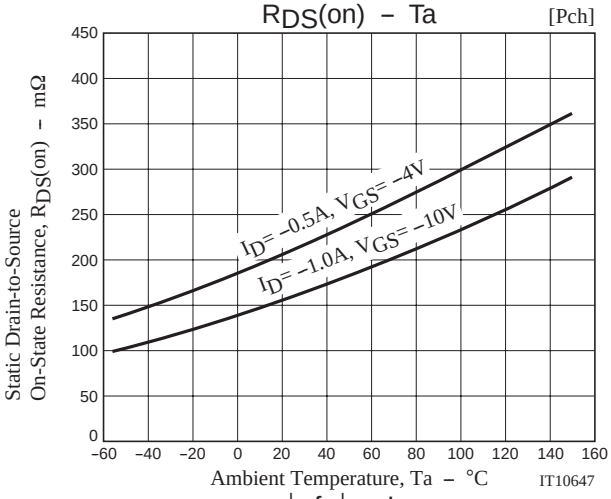


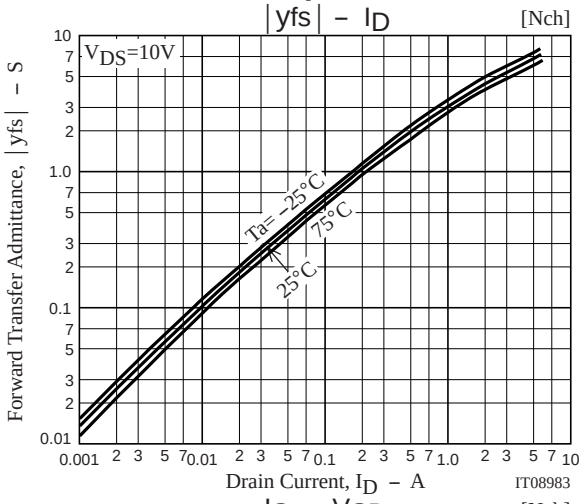


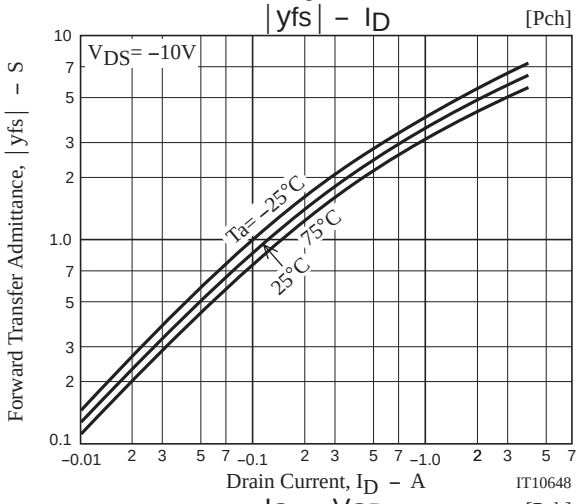

RDS(on) – VGS
[Nch]
Ta=25°C
ID=0.5A
1.5A
Static Drain-to-Source On-State Resistance, RDS(on) – mΩ
Gate-to-Source Voltage, VGS – V
IT08981

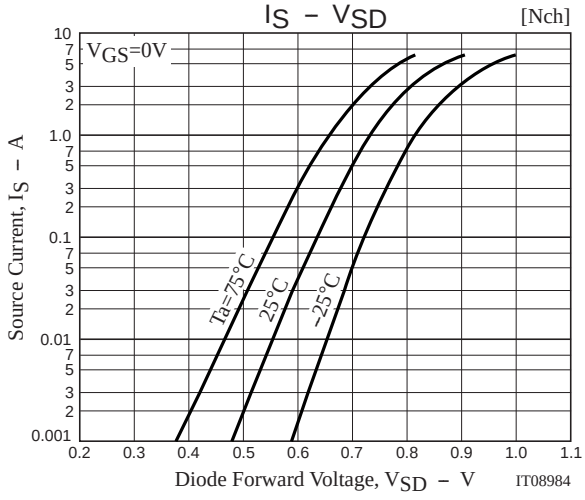

RDS(on) – VGS
[Pch]
Ta=25°C
–1A
ID= –0.5A
Static Drain-to-Source On-State Resistance, RDS(on) – mΩ
Gate-to-Source Voltage, VGS – V
IT10646

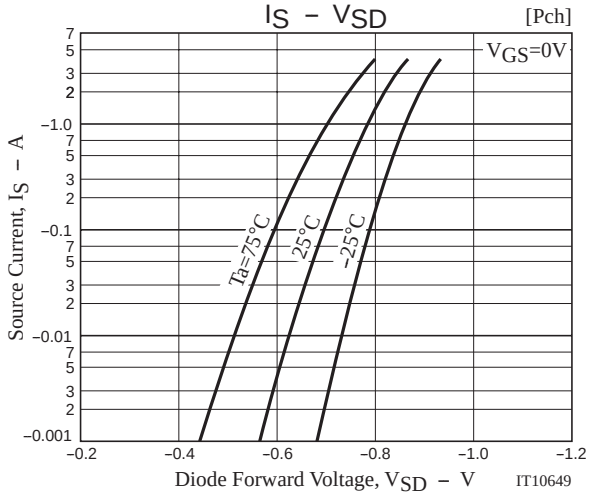

RDS(on) – Ta
[Nch]
ID=0.5A, VGS=4V
ID=1.5A, VGS=10V
Static Drain-to-Source On-State Resistance, RDS(on) – mΩ
Ambient Temperature, Ta – °C
IT08982

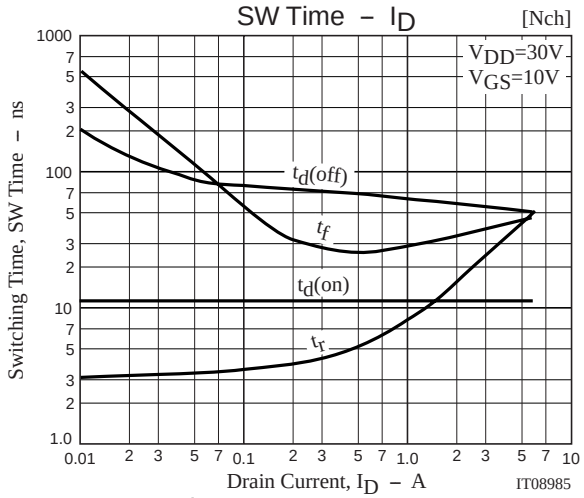

RDS(on) – Ta
[Pch]
ID= –0.5A, VGS= –4V
ID= –1.0A, VGS= –10V
Static Drain-to-Source On-State Resistance, RDS(on) – mΩ
Ambient Temperature, Ta – °C
IT10647

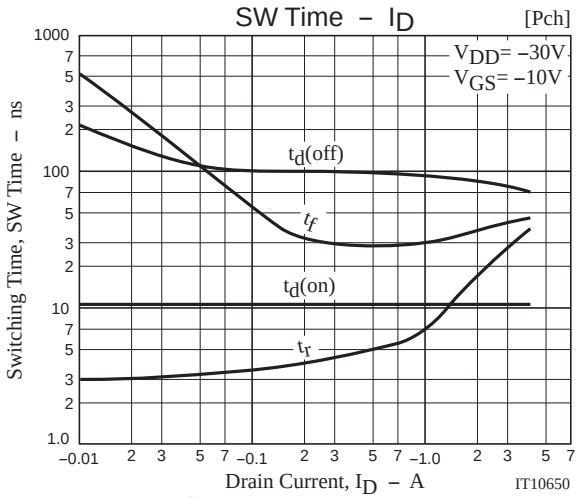

|yfs| – ID
[Nch]
VDS=10V
Ta= –25°C
75°C
25°C
Forward Transfer Admittance, |yfs| – S
Drain Current, ID – A
IT08983

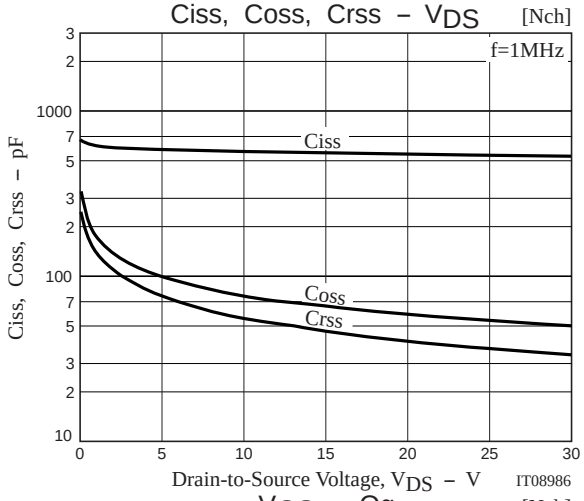

|yfs| – ID
[Pch]
VDS= –10V
Ta= –25°C
25°C
75°C
Forward Transfer Admittance, |yfs| – S
Drain Current, ID – A
IT10648

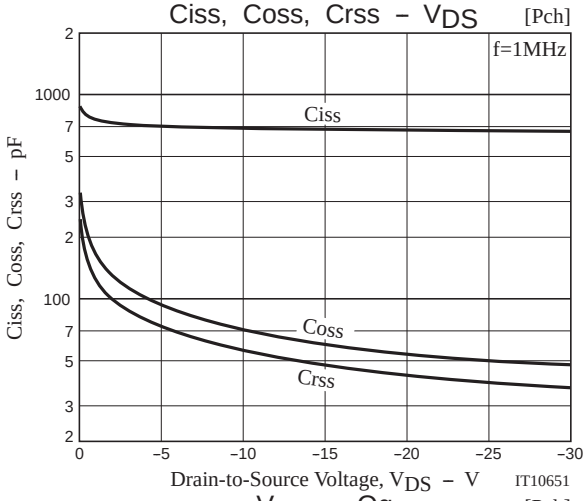

IS – VSD
[Nch]
VGS=0V
Ta=75°C
25°C
–25°C
Source Current, IS – A
Diode Forward Voltage, VSD – V
IT08984

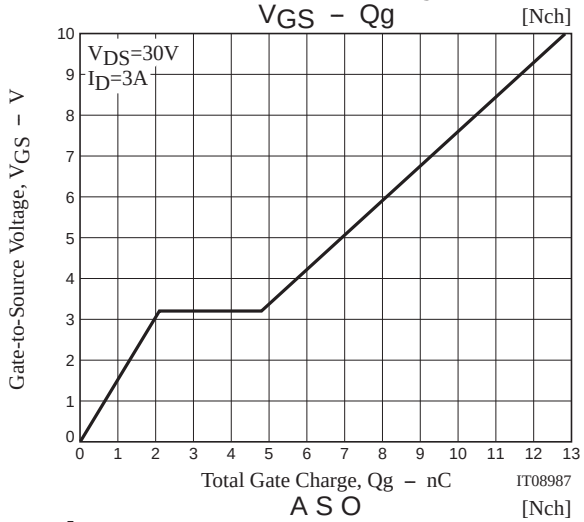

IS – VSD
[Pch]
VGS=0V
Ta=75°C
25°C
–25°C
Source Current, IS – A
Diode Forward Voltage, VSD – V
IT10649

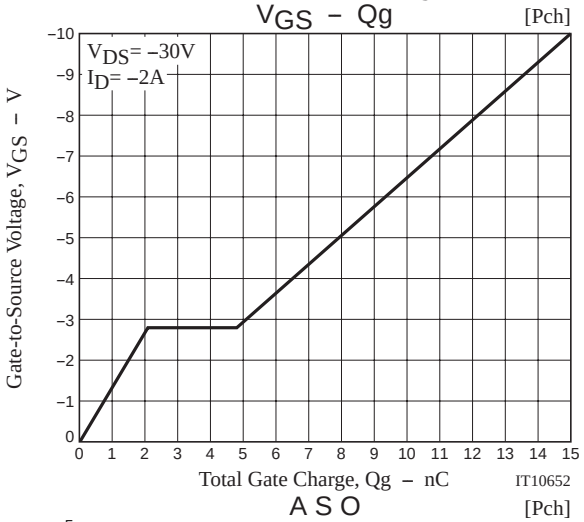

SW Time – ID
[Nch]
VDD=30V
VGS=10V
td(off)
tf
td(on)
tr
Switching Time, SW Time – ns
Drain Current, ID – A
IT08985

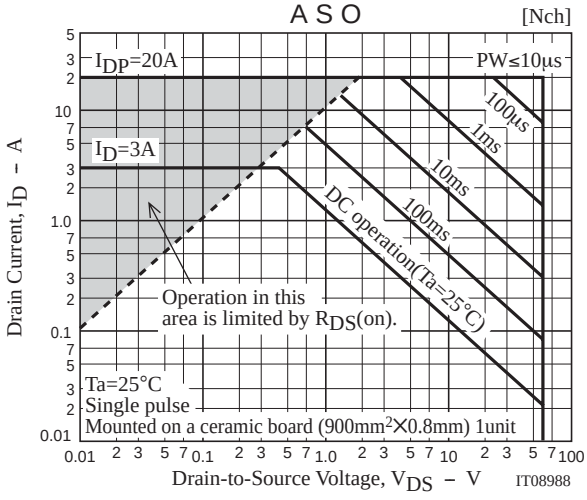

SW Time – ID
[Pch]
VDD= –30V
VGS= –10V
td(off)
tf
td(on)
tr
Switching Time, SW Time – ns
Drain Current, ID – A
IT10650

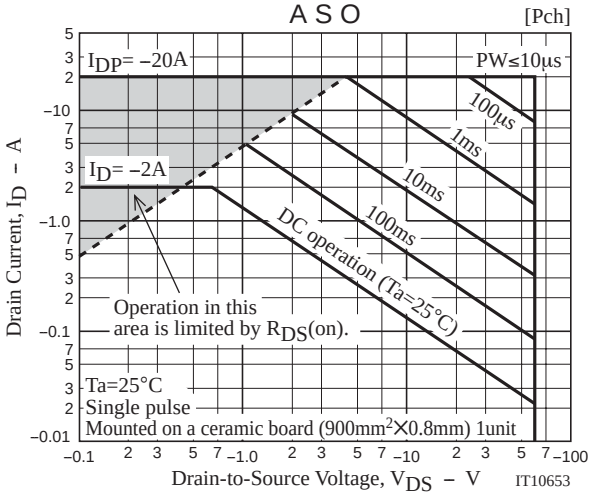

Ciss, Coss, Crss – VDS
[Nch]
f=1MHz
Ciss
Coss
Crss
Ciss, Coss, Crss – pF
Drain-to-Source Voltage, VDS – V
IT08986

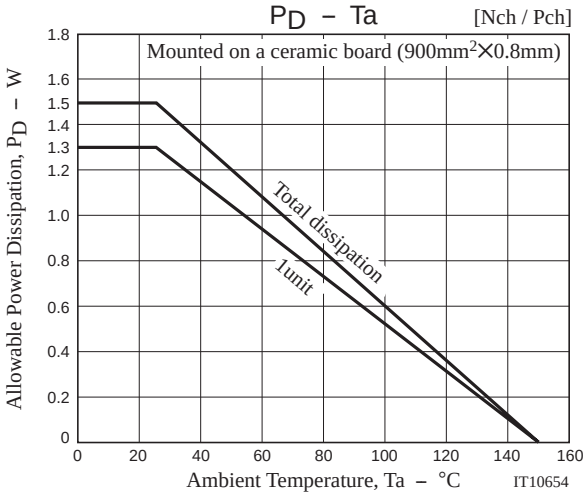

Ciss, Coss, Crss – VDS
[Pch]
f=1MHz
Ciss
Coss
Crss
Ciss, Coss, Crss – pF
Drain-to-Source Voltage, VDS – V
IT10651


VGS – Qg
[Nch]
VDS=30V
ID=3A
Gate-to-Source Voltage, VGS – V
Total Gate Charge, Qg – nC
IT08987


VGS – Qg
[Pch]
VDS= –30V
ID= –2A
Gate-to-Source Voltage, VGS – V
Total Gate Charge, Qg – nC
IT10652


A S O
[Nch]
IDP=20A
PW≤10μs
ID=3A
100μs
1ms
10ms
100ms
DC operation(Ta=25°C)
Operation in this
area is limited by RDS(on).
Ta=25°C
Single pulse
Mounted on a ceramic board (900mm2×0.8mm) 1unit
Drain Current, ID – A
Drain-to-Source Voltage, VDS – V
IT08988


A S O
[Pch]
IDP= –20A
PW≤10μs
ID= –2A
100μs
1ms
10ms
100ms
DC operation (Ta=25°C)
Operation in this
area is limited by RDS(on).
Ta=25°C
Single pulse
Mounted on a ceramic board (900mm2×0.8mm) 1unit
Drain Current, ID – A
Drain-to-Source Voltage, VDS – V
IT10653



Note on usage : Since the ECH8619 is a MOSFET product, please avoid using this device in the vicinity of highly charged objects.