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# ECH8619 — N-Channel and P-Channel Silicon MOSFETs

## 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 <sub>DSS</sub>		60	-60	V
Gate-to-Source Voltage	V <sub>GSS</sub>		±20	±20	V
Drain Current (DC)	I <sub>D</sub>		3	-2	A
Drain Current (Pulse)	I <sub>DP</sub>	PW≤10μs, duty cycle≤1%	20	-20	A
Allowable Power Dissipation	P <sub>D</sub>	Mounted on a ceramic board (900mm <sup>2</sup> ×0.8mm) 1unit	1.3		W
Total Dissipation	P <sub>T</sub>	Mounted on a ceramic board (900mm <sup>2</sup> ×0.8mm)	1.5		W
Channel Temperature	T <sub>ch</sub>		150		°C
Storage Temperature	T <sub>stg</sub>		-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 <sub>(BR)DSS</sub>	I <sub>D</sub> =1mA, V <sub>GS</sub> =0V	60			V
Zero-Gate Voltage Drain Current	I <sub>DSS</sub>	V <sub>DS</sub> =60V, V <sub>GS</sub> =0V			1	μA
Gate-to-Source Leakage Current	I <sub>GSS</sub>	V <sub>GS</sub> =±16V, V <sub>DS</sub> =0V			±10	μA
Cutoff Voltage	V <sub>GS(off)</sub>	V <sub>DS</sub> =10V, I <sub>D</sub> =1mA	1.2		2.6	V
Forward Transfer Admittance	y <sub>fs</sub>	V <sub>DS</sub> =10V, I <sub>D</sub> =1.5A	2.2	3.8		S
Static Drain-to-Source On-State Resistance	R <sub>DS(on)1</sub>	I <sub>D</sub> =1.5A, V <sub>GS</sub> =10V		70	93	mΩ
	R <sub>DS(on)2</sub>	I <sub>D</sub> =0.5A, V <sub>GS</sub> =4V		92	133	mΩ

Marking : FM

Continued on next page.

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# ECH8619

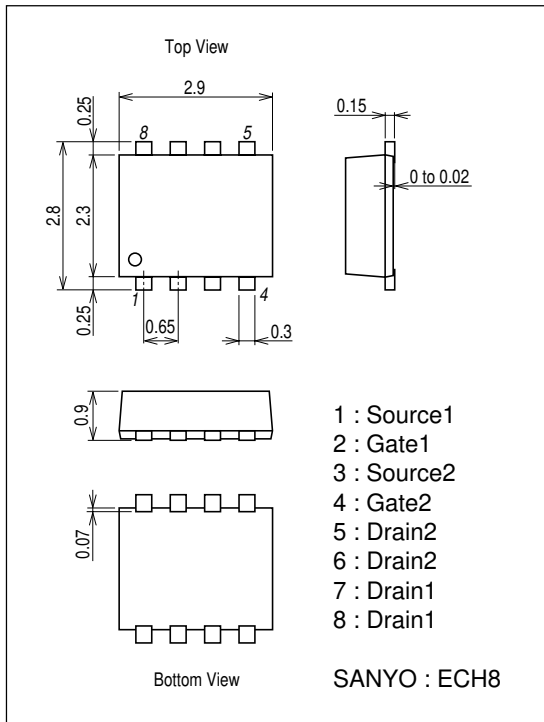
Continued from preceding page.

Parameter	Symbol	Conditions	Ratings			Unit
			min	typ	max	
Input Capacitance	Ciss	V <sub>DS</sub> =20V, f=1MHz		560		pF
Output Capacitance	Coss	V <sub>DS</sub> =20V, f=1MHz		60		pF
Reverse Transfer Capacitance	Crss	V <sub>DS</sub> =20V, f=1MHz		41		pF
Turn-ON Delay Time	t <sub>d(on)</sub>	See specified Test Circuit.		11		ns
Rise Time	t <sub>r</sub>	See specified Test Circuit.		11		ns
Turn-OFF Delay Time	t <sub>d(off)</sub>	See specified Test Circuit.		61		ns
Fall Time	t <sub>f</sub>	See specified Test Circuit.		32		ns
Total Gate Charge	Q <sub>g</sub>	V <sub>DS</sub> =30V, V <sub>GS</sub> =10V, I <sub>D</sub> =3A		12.8		nC
Gate-to-Source Charge	Q <sub>gs</sub>	V <sub>DS</sub> =30V, V <sub>GS</sub> =10V, I <sub>D</sub> =3A		2.1		nC
Gate-to-Drain "Miller" Charge	Q <sub>gd</sub>	V <sub>DS</sub> =30V, V <sub>GS</sub> =10V, I <sub>D</sub> =3A		2.7		nC
Diode Forward Voltage	V <sub>SD</sub>	I <sub>S</sub> =3A, V <sub>GS</sub> =0V		0.81	1.2	V
[P-channel]						
Drain-to-Source Breakdown Voltage	V <sub>(BR)DSS</sub>	I <sub>D</sub> =-1mA, V <sub>GS</sub> =0V	-60			V
Zero-Gate Voltage Drain Current	I <sub>DSS</sub>	V <sub>DS</sub> =-60V, V <sub>GS</sub> =0V			-1	μA
Gate-to-Source Leakage Current	I <sub>GSS</sub>	V <sub>GS</sub> =±16V, V <sub>DS</sub> =0V			±10	μA
Cutoff Voltage	V <sub>GS(off)</sub>	V <sub>DS</sub> =-10V, I <sub>D</sub> =-1mA	-1.2		-2.6	V
Forward Transfer Admittance	y <sub>fs</sub>	V <sub>DS</sub> =-10V, I <sub>D</sub> =-1A	2.1	3.5		S
Static Drain-to-Source On-State Resistance	R <sub>DS(on)1</sub>	I <sub>D</sub> =-1A, V <sub>GS</sub> =-10V		160	210	mΩ
	R <sub>DS(on)2</sub>	I <sub>D</sub> =-0.5A, V <sub>GS</sub> =-4V		210	295	mΩ
Input Capacitance	Ciss	V <sub>DS</sub> =-20V, f=1MHz		660		pF
Output Capacitance	Coss	V <sub>DS</sub> =-20V, f=1MHz		54		pF
Reverse Transfer Capacitance	Crss	V <sub>DS</sub> =-20V, f=1MHz		42		pF
Turn-ON Delay Time	t <sub>d(on)</sub>	See specified Test Circuit.		10.5		ns
Rise Time	t <sub>r</sub>	See specified Test Circuit.		7.0		ns
Turn-OFF Delay Time	t <sub>d(off)</sub>	See specified Test Circuit.		93		ns
Fall Time	t <sub>f</sub>	See specified Test Circuit.		30		ns
Total Gate Charge	Q <sub>g</sub>	V <sub>DS</sub> =-30V, V <sub>GS</sub> =-10V, I <sub>D</sub> =-2A		15		nC
Gate-to-Source Charge	Q <sub>gs</sub>	V <sub>DS</sub> =-30V, V <sub>GS</sub> =-10V, I <sub>D</sub> =-2A		2.1		nC
Gate-to-Drain "Miller" Charge	Q <sub>gd</sub>	V <sub>DS</sub> =-30V, V <sub>GS</sub> =-10V, I <sub>D</sub> =-2A		2.7		nC
Diode Forward Voltage	V <sub>SD</sub>	I <sub>S</sub> =-2A, V <sub>GS</sub> =0V		-0.82	-1.2	V

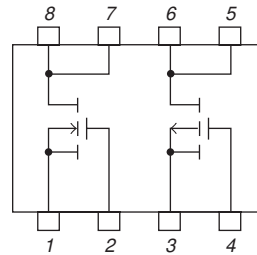
## Package Dimensions

unit : mm (typ)

7011A-001



## Electrical Connection



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

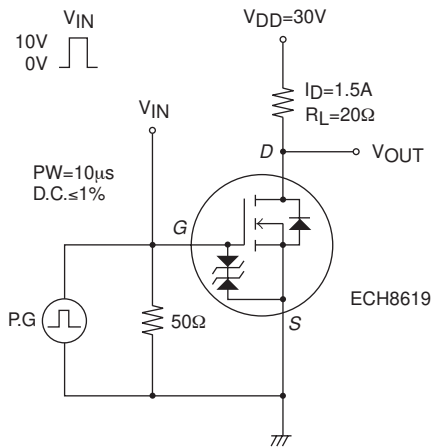
Top view



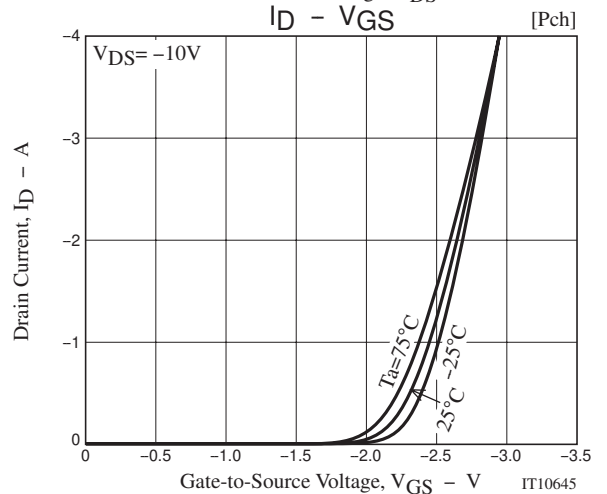
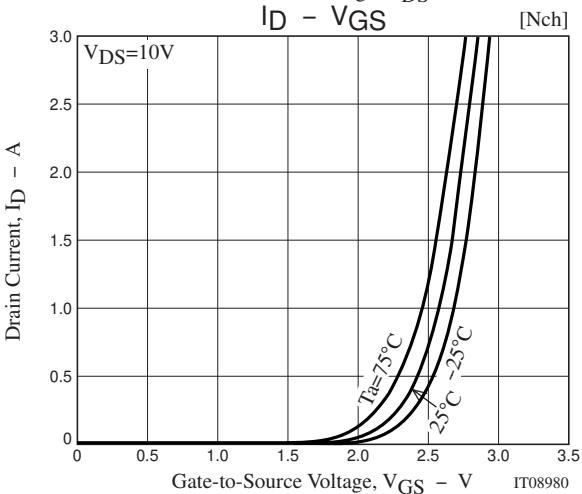
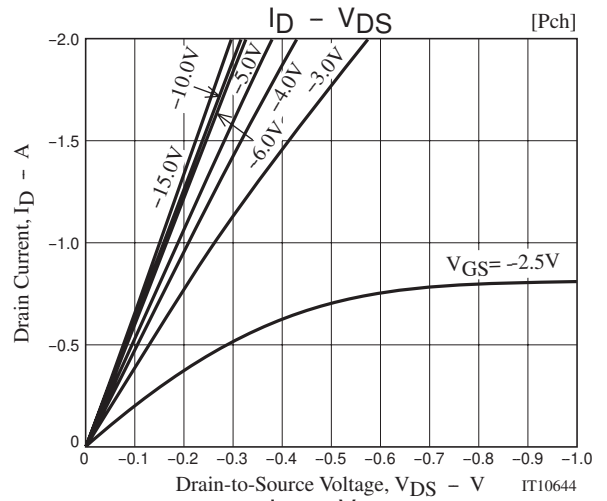
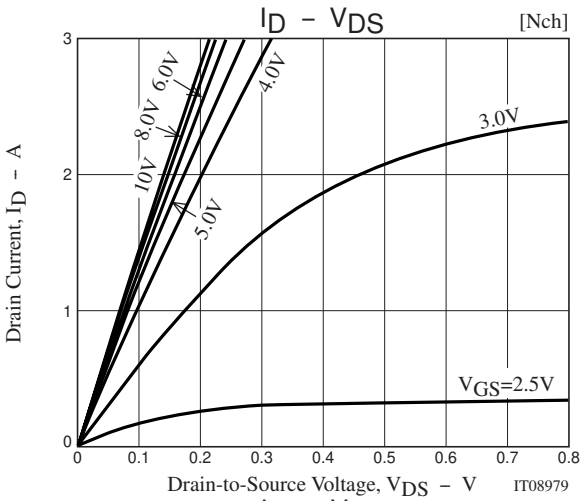
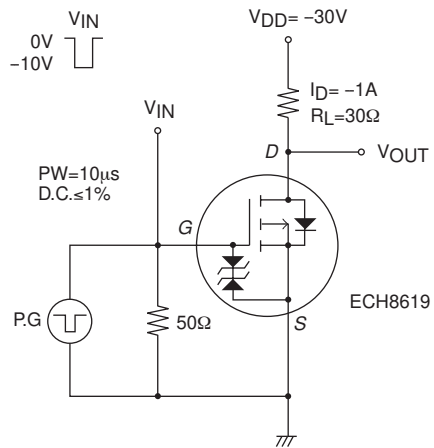
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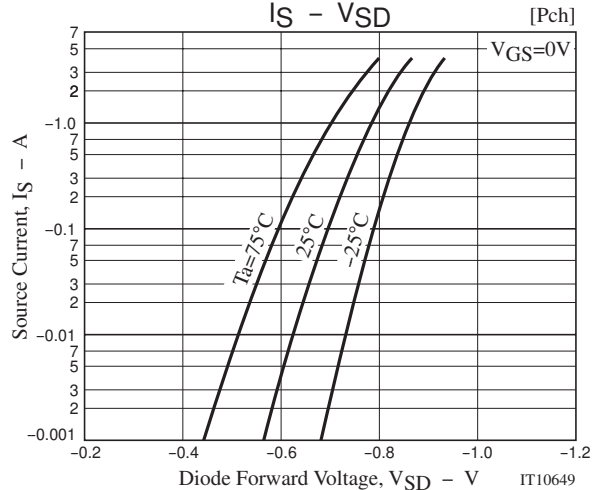
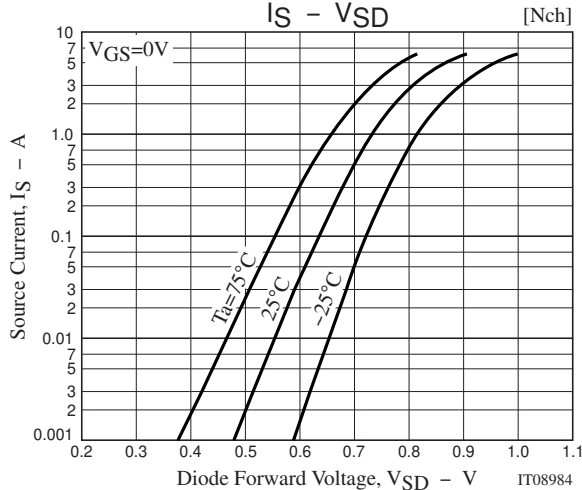
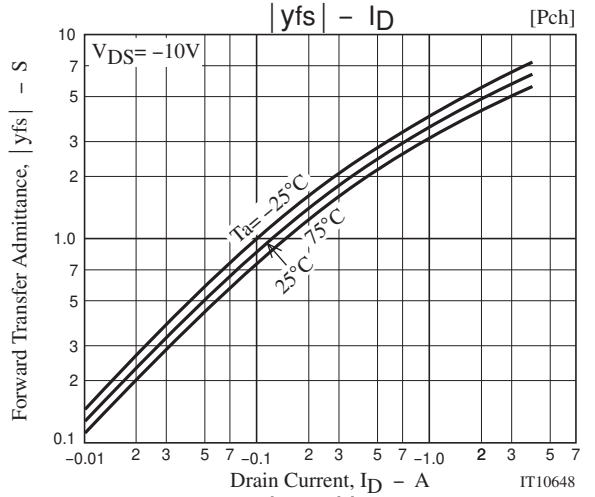
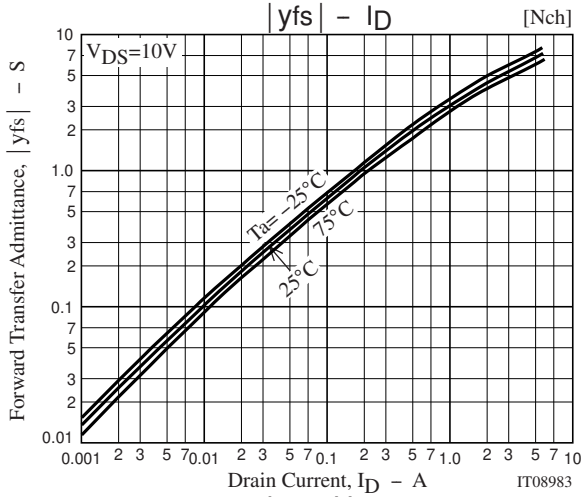
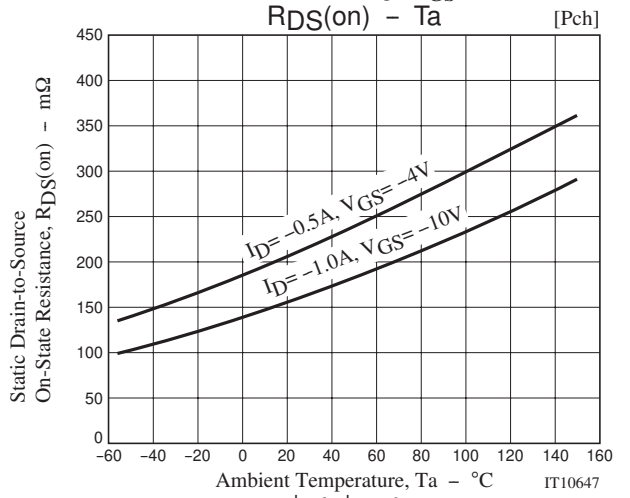
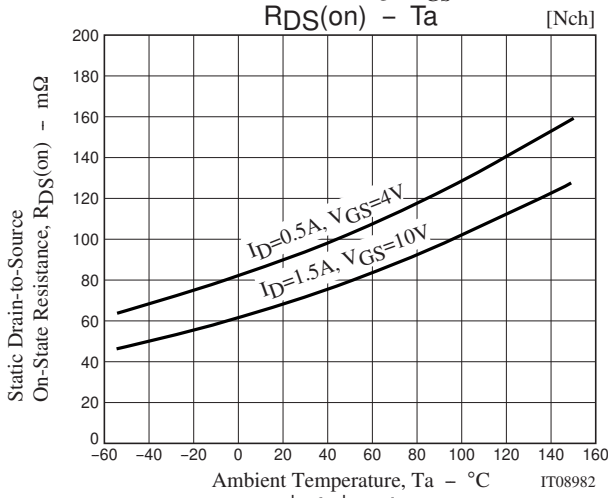
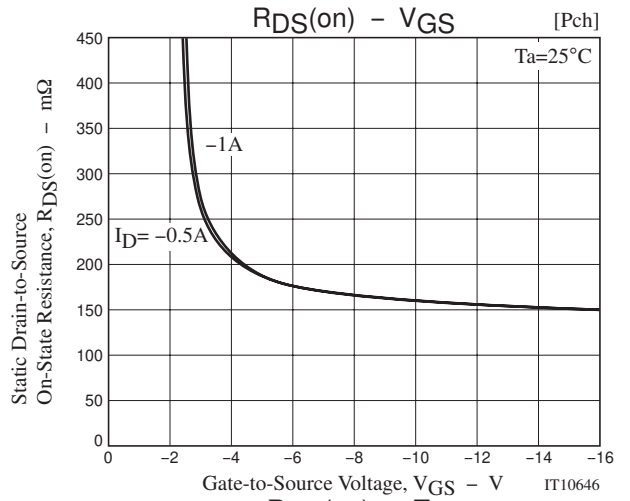
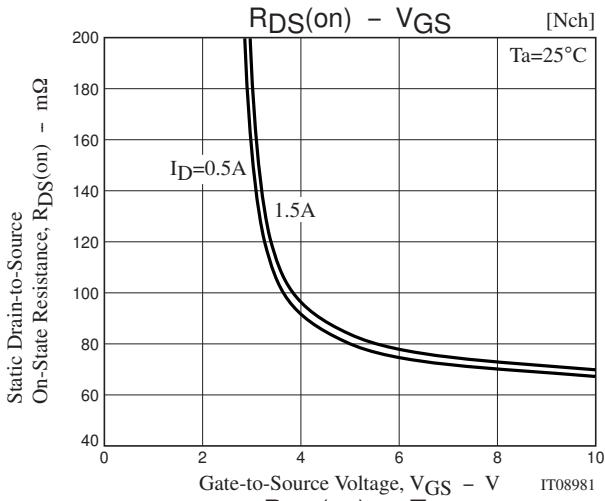
## Switching Time Test Circuit

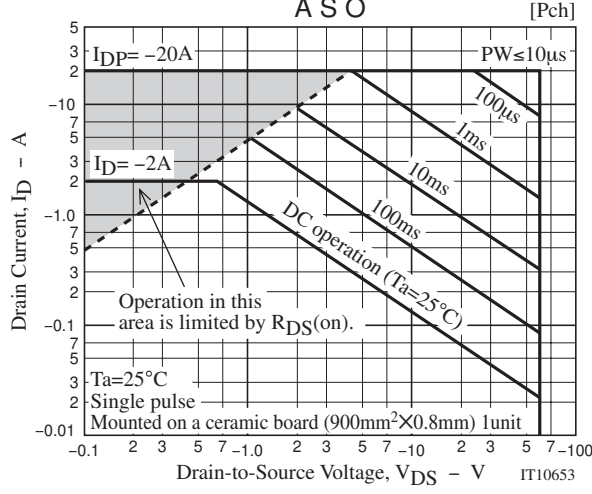
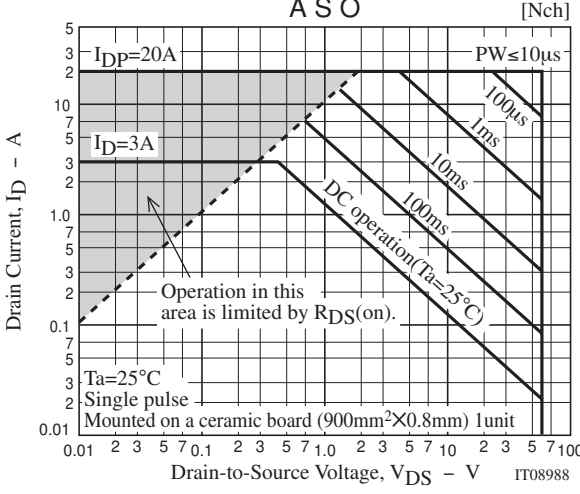
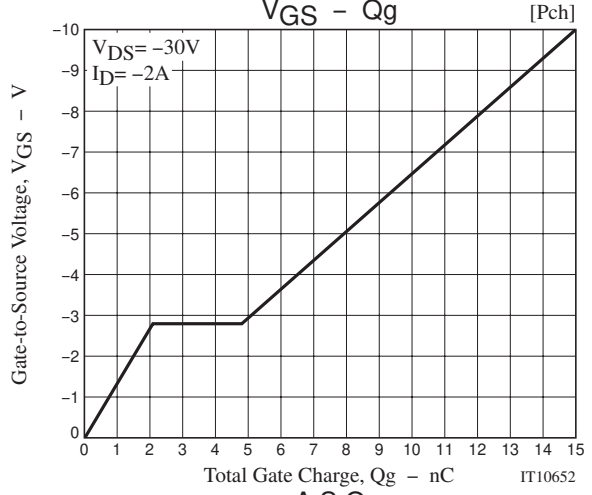
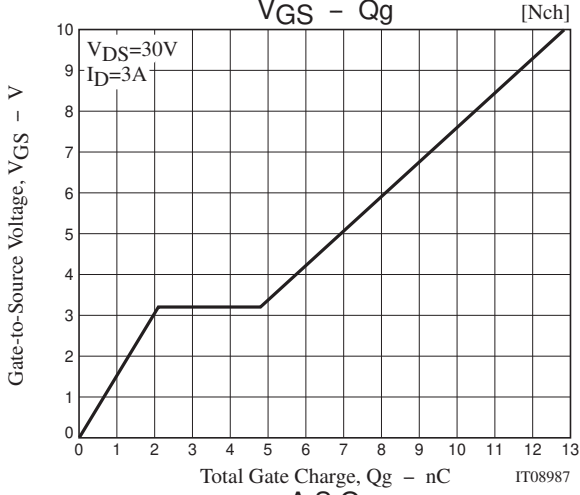
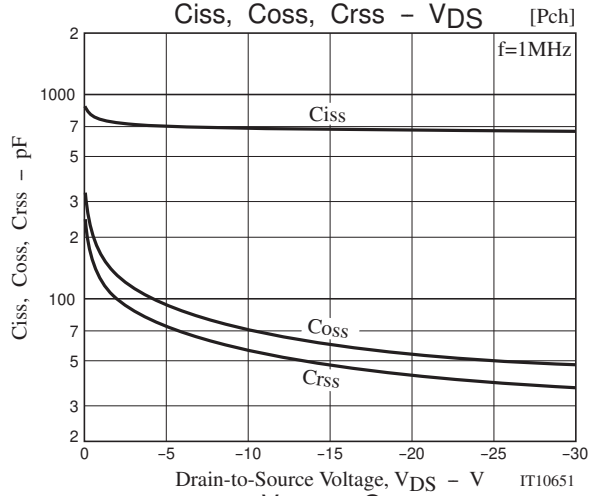
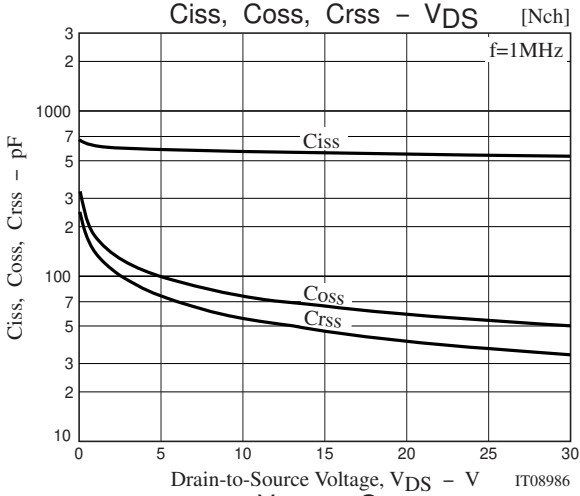
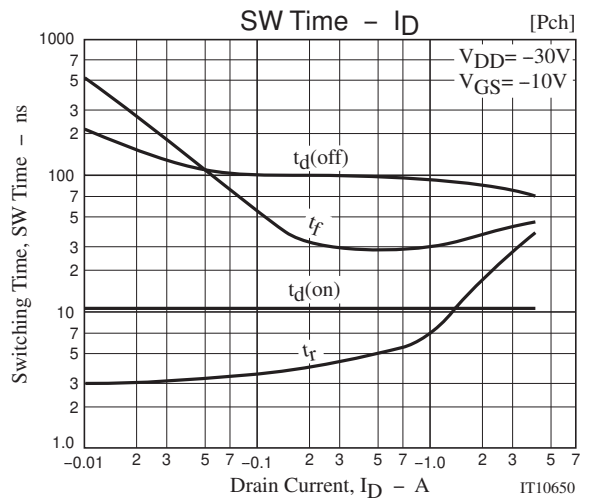
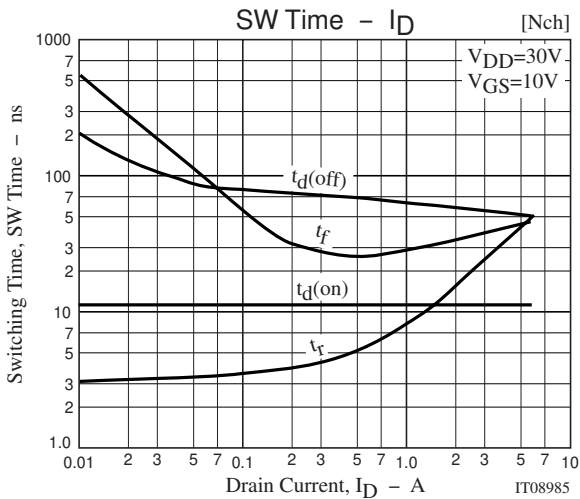
[N-channel]

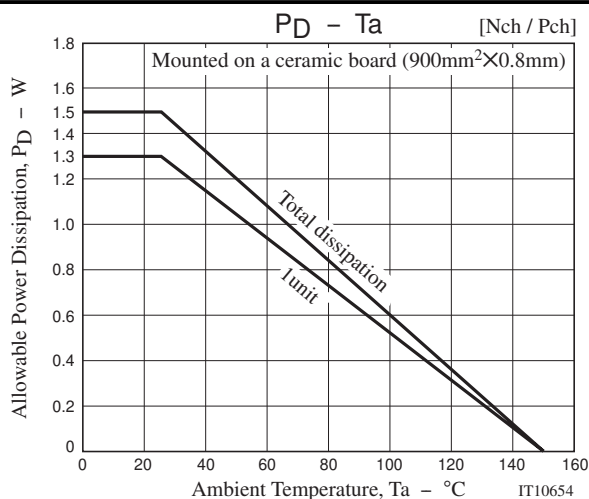


[P-channel]









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

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