Ordering number : ENA1358A

SANYO Semiconductors

DATA SHEET

An ON Semiconductor Company

N-Channel and P-Channel Silicon MOSFETs

ECH8660 — General-Purpose Switching Device Applications

Features

- The ECH8660 incorporates an N-channel MOSFET and a P-channel MOSFET that feature low ON-resistance and high-speed switching , thereby enablimg high-density mounting
- 4V drive
- Halogen free compliance

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}		±20	±20	V
Drain Current (DC)	I_D		4.5	−4.5	A
Drain Current (Pulse)	I_{DP}	PW≤10μs, duty cycle≤1%	30	−30	A
Allowable Power Dissipation	P_D	When mounted on ceramic substrate (1200mm^2×0.8mm) 1unit	1.3		W
Total Dissipation	P_T	When mounted on ceramic substrate (1200mm^2×0.8mm)	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	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
Cutoff Voltage	V_{GS}(off)	V_{DS}=10V, I_D=1mA	1.2		2.6	V

Marking : TF

Continued on next page.

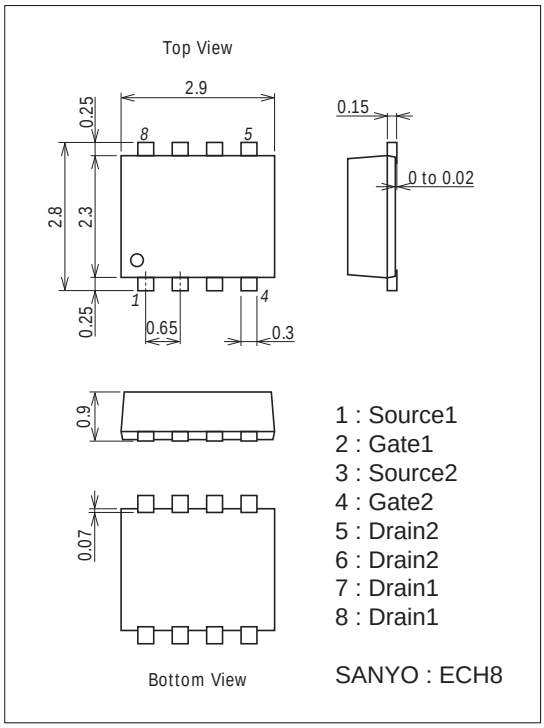
Continued from preceding page.

Parameter	Symbol	Conditions	Ratings			Unit
			min	typ	max	
Forward Transfer Admittance	| yfs |	V_{DS}=10V, I_D=2A	1	1.66		S
Static Drain-to-Source On-State Resistance	R_{DS}(on)1	I_D=2A, V_{GS}=10V		45	59	mΩ
	R_{DS}(on)2	I_D=1A, V_{GS}=4.5V		85	119	mΩ
	R_{DS}(on)3	I_D=1A, V_{GS}=4V		110	155	mΩ
Input Capacitance	Ciss	V_{DS}=10V, f=1MHz		240		pF
Output Capacitance	Coss	V_{DS}=10V, f=1MHz		45		pF
Reverse Transfer Capacitance	Crss	V_{DS}=10V, f=1MHz		30		pF
Turn-ON Delay Time	t_d(on)	See specified Test Circuit.		6.2		ns
Rise Time	t_r	See specified Test Circuit.		11		ns
Turn-OFF Delay Time	t_d(off)	See specified Test Circuit.		17		ns
Fall Time	t_f	See specified Test Circuit.		7.5		ns
Total Gate Charge	Qg	V_{DS}=10V, V_{GS}=10V, I_D=4.5A		4.4		nC
Gate-to-Source Charge	Qgs	V_{DS}=10V, V_{GS}=10V, I_D=4.5A		1.1		nC
Gate-to-Drain “Miller” Charge	Qgd	V_{DS}=10V, V_{GS}=10V, I_D=4.5A		0.64		nC
Diode Forward Voltage	V_{SD}	I_S=4.5A, V_{GS}=0V		0.84	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
Cutoff Voltage	V_{GS}(off)	V_{DS}=−10V, I_D=−1mA	−1.2		−2.3	V
Forward Transfer Admittance	| yfs |	V_{DS}=−10V, I_D=−2A	2.5	4.2		S
Static Drain-to-Source On-State Resistance	R_{DS}(on)1	I_D=−2A, V_{GS}=−10V		45	59	mΩ
	R_{DS}(on)2	I_D=−1A, V_{GS}=−4.5V		71	100	mΩ
	R_{DS}(on)3	I_D=−1A, V_{GS}=−4V		82	115	mΩ
Input Capacitance	Ciss	V_{DS}=−10V, f=1MHz		430		pF
Output Capacitance	Coss	V_{DS}=−10V, f=1MHz		105		pF
Reverse Transfer Capacitance	Crss	V_{DS}=−10V, f=1MHz		75		pF
Turn-ON Delay Time	t_d(on)	See specified Test Circuit.		7.5		ns
Rise Time	t_r	See specified Test Circuit.		26		ns
Turn-OFF Delay Time	t_d(off)	See specified Test Circuit.		45		ns
Fall Time	t_f	See specified Test Circuit.		35		ns
Total Gate Charge	Qg	V_{DS}=−10V, V_{GS}=−10V, I_D=−4.5A		10		nC
Gate-to-Source Charge	Qgs	V_{DS}=−10V, V_{GS}=−10V, I_D=−4.5A		2.0		nC
Gate-to-Drain “Miller” Charge	Qgd	V_{DS}=−10V, V_{GS}=−10V, I_D=−4.5A		2.5		nC
Diode Forward Voltage	V_{SD}	I_S=−4.5A, V_{GS}=0V		−0.85	−1.2	V

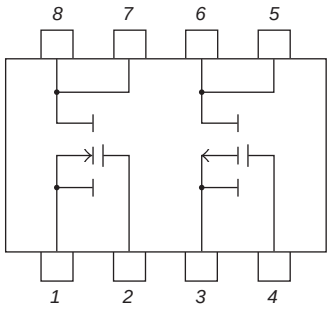
Package Dimensions

unit : mm (typ)

7011A-001

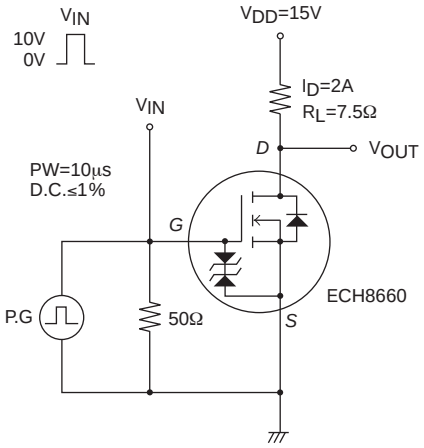


Electrical Connection

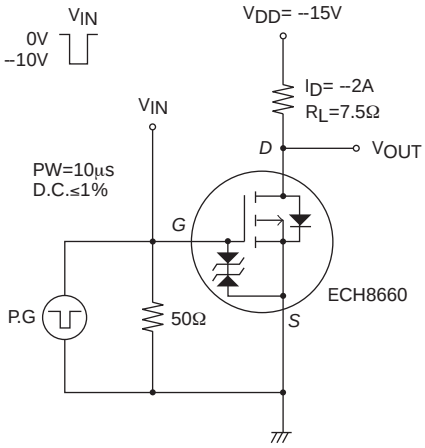


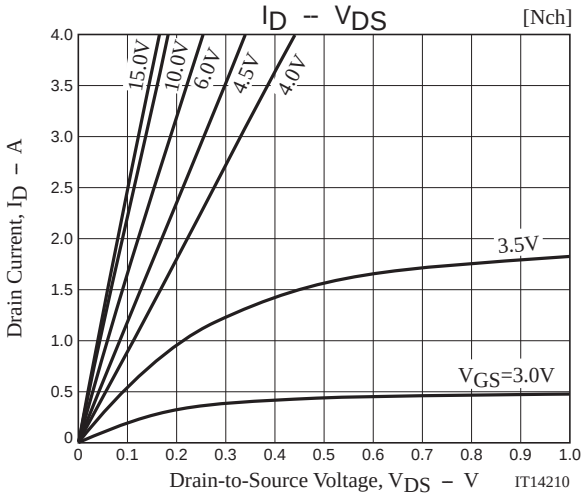
Switching Time Test Circuit

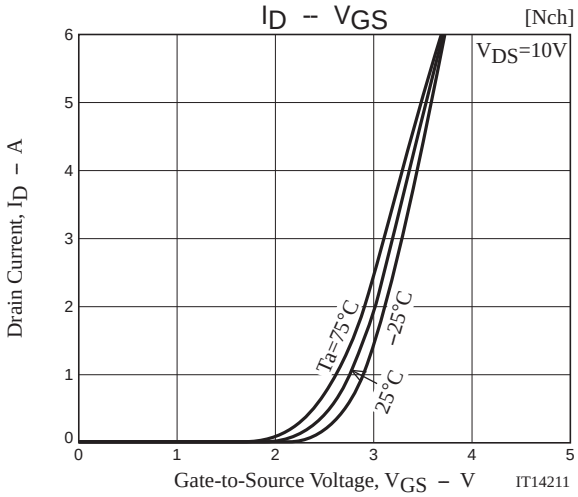
[N-channel]

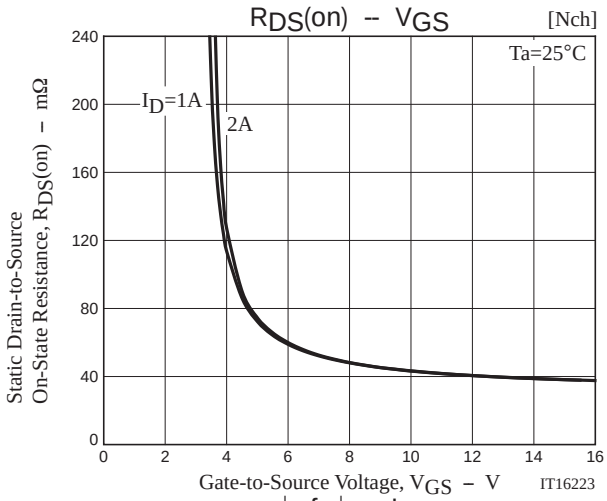


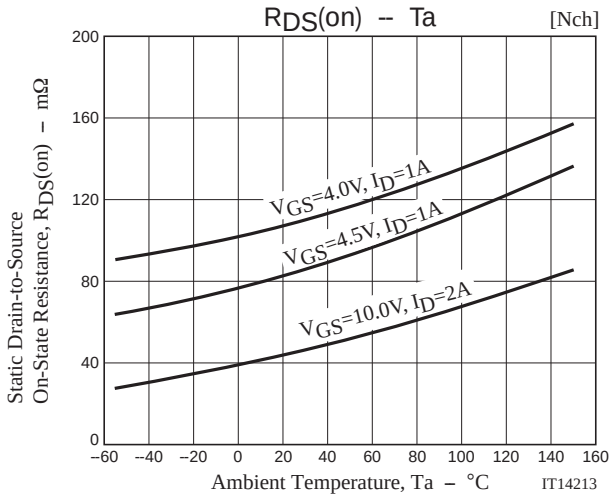
[P-channel]

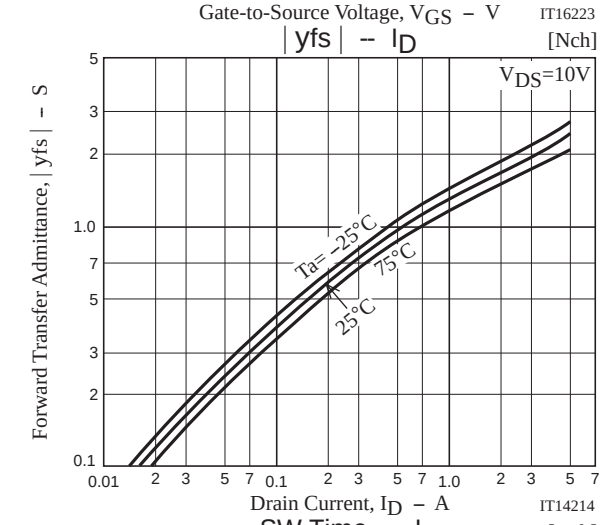


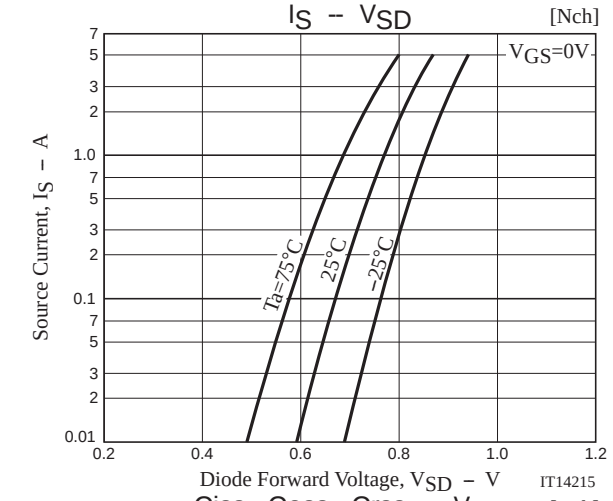


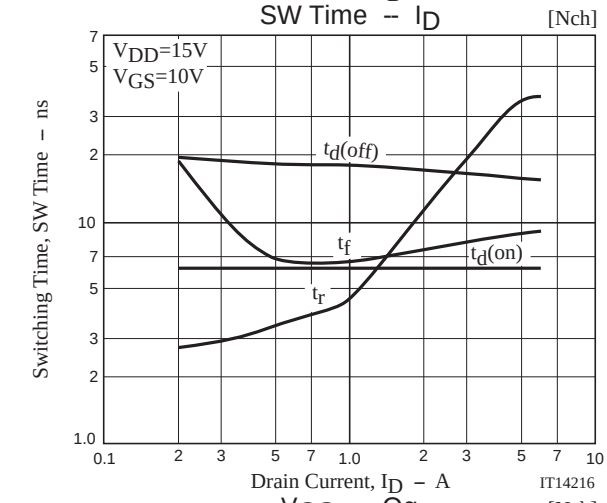


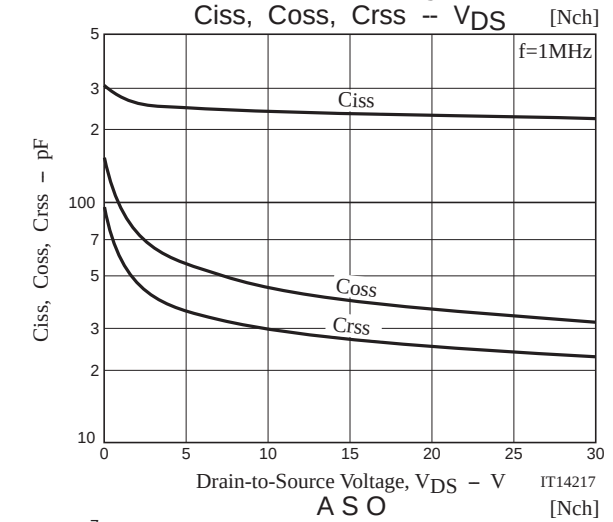

RDS(on) -- VGS
[Nch]
Ta=25°C
ID=1A
2A
Static Drain-to-Source On-State Resistance, RDS(on) – mΩ
Gate-to-Source Voltage, VGS – V
IT16223

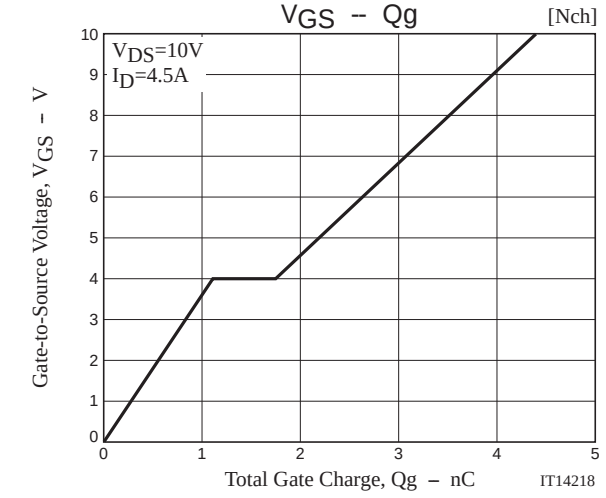

RDS(on) -- Ta
[Nch]
VGS=4.0V, ID=1A
VGS=4.5V, ID=1A
VGS=10.0V, ID=2A
Static Drain-to-Source On-State Resistance, RDS(on) – mΩ
Ambient Temperature, Ta – °C
IT14213

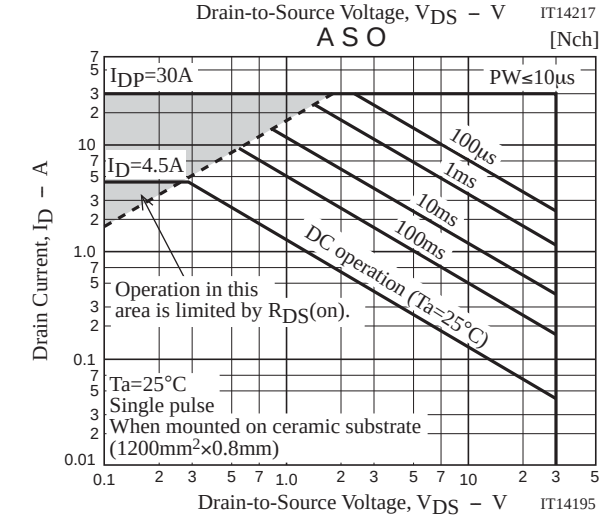

| yfs | -- ID
[Nch]
VDS=10V
Ta= –25°C
75°C
25°C
Forward Transfer Admittance, | yfs | – S
Drain Current, ID – A
IT14214

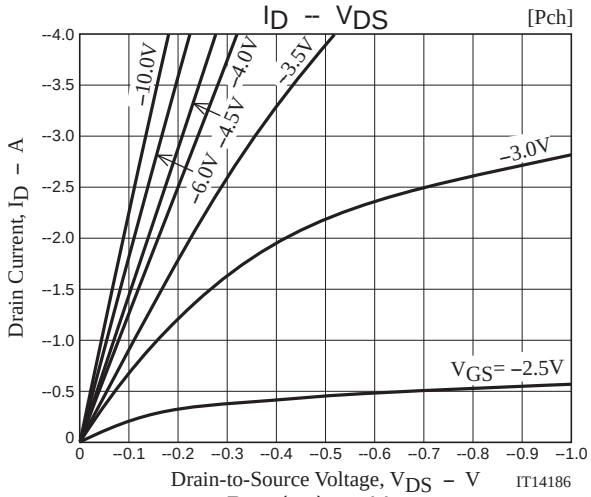

IS -- VSD
[Nch]
VGS=0V
Ta=75°C
25°C
–25°C
Source Current, IS – A
Diode Forward Voltage, VSD – V
IT14215

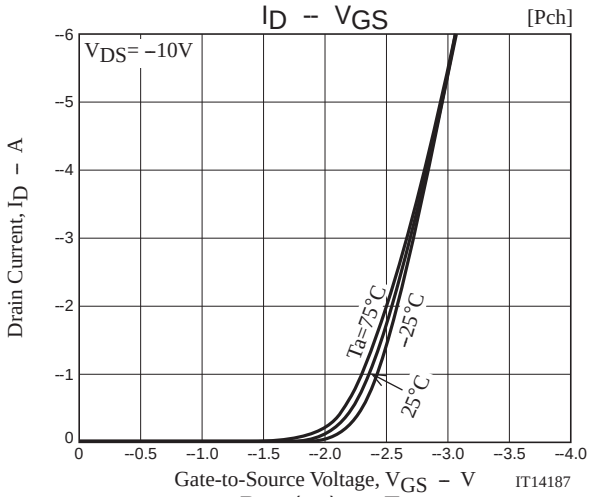

SW Time -- ID
[Nch]
VDD=15V
VGS=10V
td(off)
tf
td(on)
tr
Switching Time, SW Time – ns
Drain Current, ID – A
IT14216

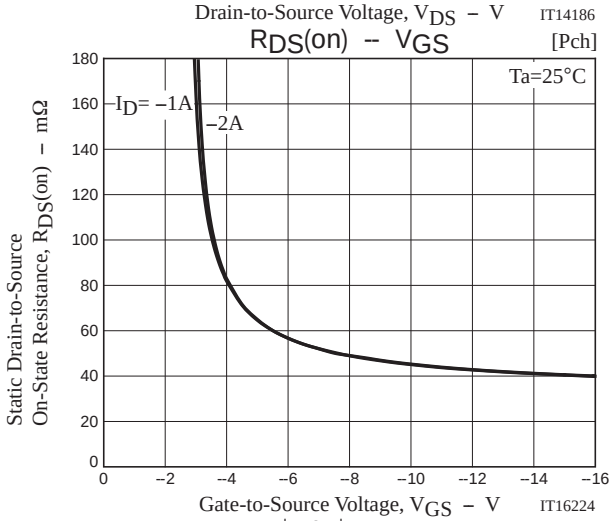

Ciss, Coss, Crss -- VDS
[Nch]
f=1MHz
Ciss
Coss
Crss
Ciss, Coss, Crss – pF
Drain-to-Source Voltage, VDS – V
IT14217

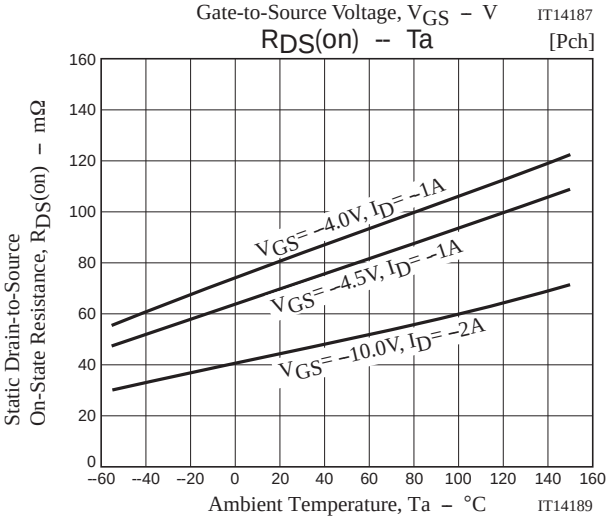

VGS -- Qg
[Nch]
VDS=10V
ID=4.5A
Gate-to-Source Voltage, VGS – V
Total Gate Charge, Qg – nC
IT14218

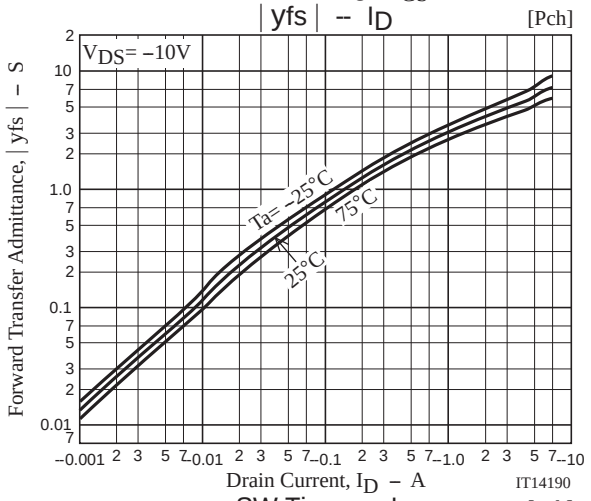

A S O
[Nch]
IDP=30A
PW≤10μs
ID=4.5A
100μs
1ms
10ms
100ms
DC operation (Ta=25°C)
Operation in this area is limited by RDS(on).
Ta=25°C
Single pulse
When mounted on ceramic substrate (1200mm²×0.8mm)
Drain Current, ID – A
Drain-to-Source Voltage, VDS – V
IT14195

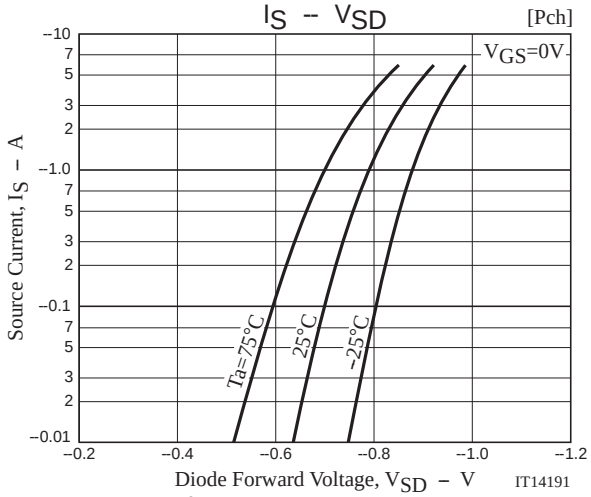

ID -- VDS
[Pch]
Drain Current, ID – A
Drain-to-Source Voltage, VDS – V
IT14186
–10.0V
–6.0V
–4.5V
–4.0V
–3.5V
–3.0V
VGS= –2.5V

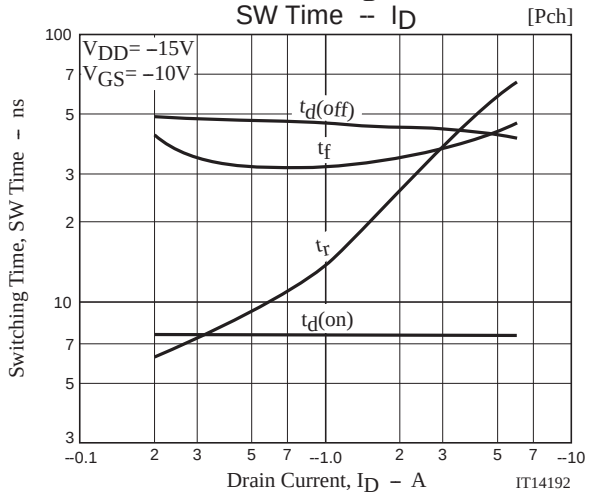

ID -- VGS
[Pch]
VDS= –10V
Drain Current, ID – A
Gate-to-Source Voltage, VGS – V
IT14187
Ta=75°C
25°C
–25°C

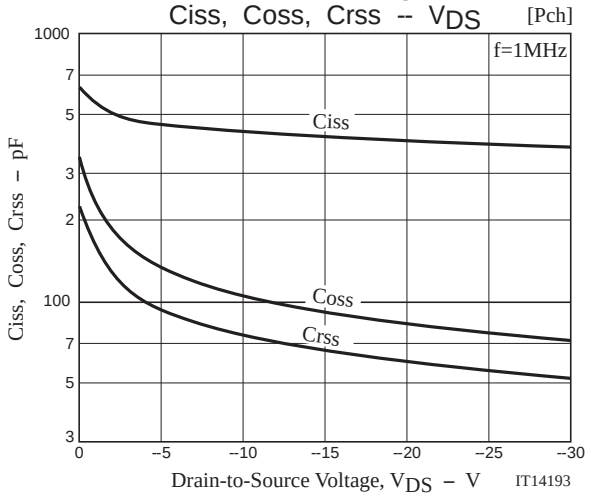

RDS(on) -- VGS
[Pch]
Ta=25°C
ID= –1A
–2A
Static Drain-to-Source On-State Resistance, RDS(on) – mΩ
Gate-to-Source Voltage, VGS – V
IT16224

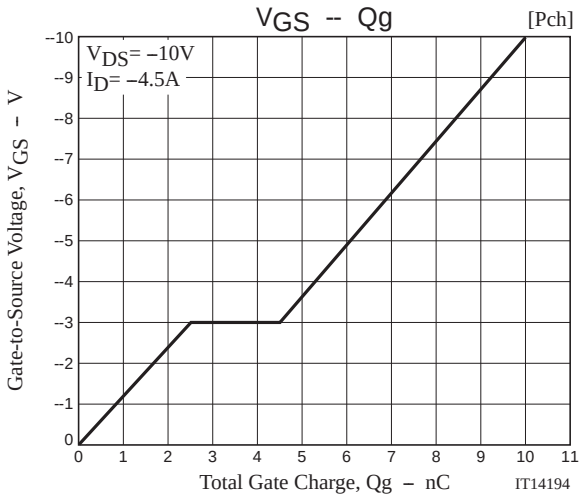

RDS(on) -- Ta
[Pch]
VGS= –4.0V, ID= –1A
VGS= –4.5V, ID= –1A
VGS= –10.0V, ID= –2A
Static Drain-to-Source On-State Resistance, RDS(on) – mΩ
Ambient Temperature, Ta – °C
IT14189

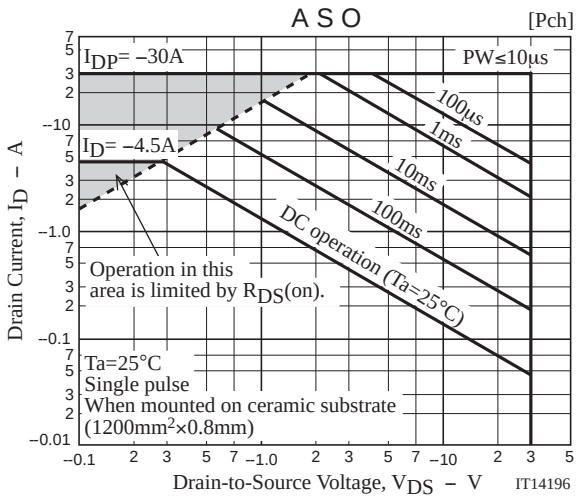

| yfs | -- ID
[Pch]
VDS= –10V
Ta= –25°C
25°C
75°C
Forward Transfer Admittance, | yfs | – S
Drain Current, ID – A
IT14190

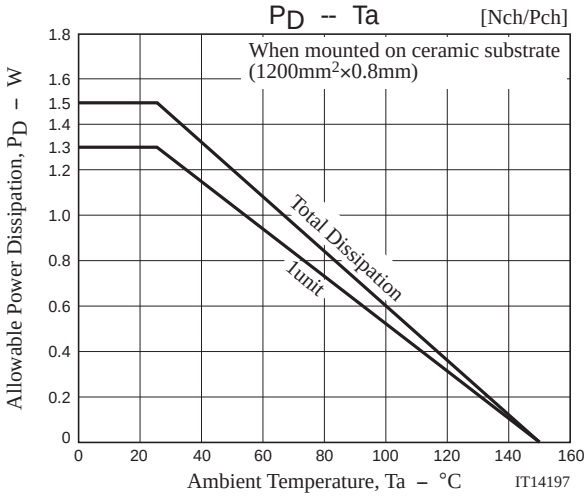

IS -- VSD
[Pch]
VGS=0V
Ta=75°C
25°C
–25°C
Source Current, IS – A
Diode Forward Voltage, VSD – V
IT14191


SW Time -- ID
[Pch]
VDD= –15V
VGS= –10V
td(off)
tf
tr
td(on)
Switching Time, SW Time – ns
Drain Current, ID – A
IT14192


Ciss, Coss, Crss -- VDS
[Pch]
f=1MHz
Ciss
Coss
Crss
Ciss, Coss, Crss – pF
Drain-to-Source Voltage, VDS – V
IT14193







Note on usage : Since the ECH8660 is a MOSFET product, please avoid using this device in the vicinity of highly charged objects.

This catalog provides information as of December, 2010. Specifications and information herein are subject to change without notice.