Ordering number : ENA2185B

ECH8690

Power MOSFET

60V, 4.7A, 55mΩ -60V, -3.5A, 94mΩ Complememtary Dual ECH8

ON Semiconductor®

http://onsemi.com

Features

- On-State Resistance Nch:RDS(on)1=42mΩ(typ.)
  Pch:RDS(on)1=73mΩ(typ.)
- 4V drive
- Nch+Pch MOSFET
- Protection diode in
- Halogen free compliance

Specifications

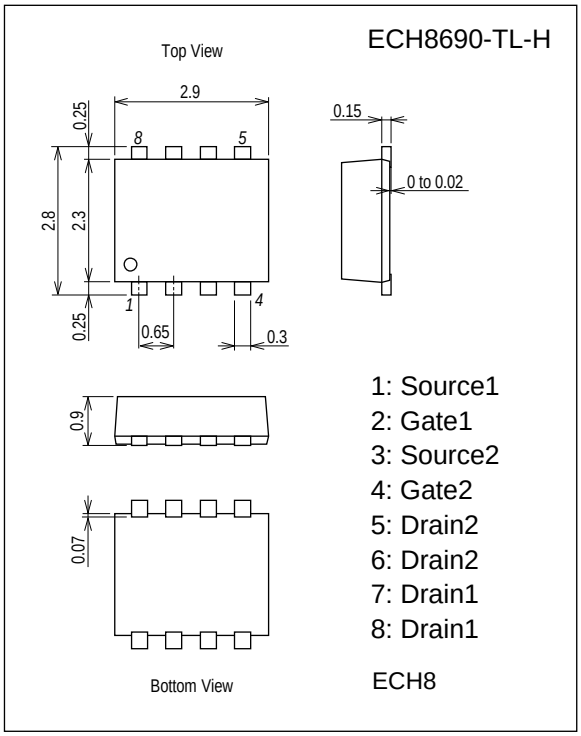
Absolute Maximum Ratings at Ta = 25°C

Parameter	Symbol	Conditions	N-channel	P-channel	Unit
Drain to Source Voltage	V_{DSS}		60	-60	V
Gate to Source Voltage	V_{GSS}		±20	±20	V
Drain Current (DC)	I_D		4.7	-3.5	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	1.5		W
Total Dissipation	P_T	When mounted on ceramic substrate (1200mm^2×0.8mm)	1.8		W
Channel Temperature	Tch		150		°C
Storage Temperature	Tstg		-55 to +150		°C

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

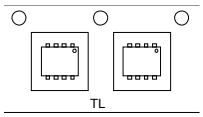
unit : mm (typ)
7011A-001



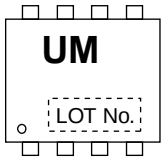
Ordering & Package Information

Device	Package	Shipping	note
ECH8690-TL-H	ECH8	3000 pcs. / reel	Pb-Free and Halogen Free

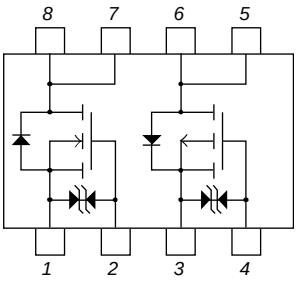
Packing Type: TL



Marking



Electrical Connection

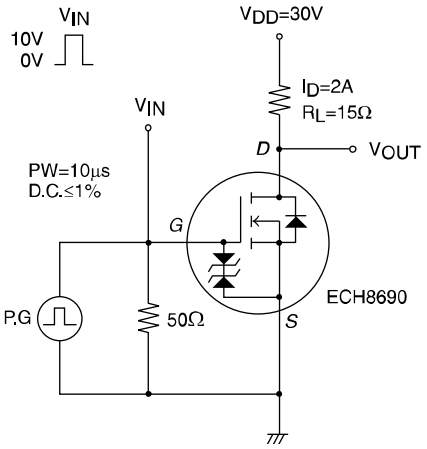


Electrical Characteristics at Ta = 25°C

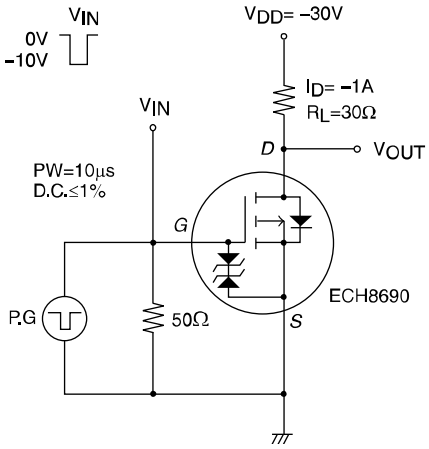
Parameter	Symbol	Conditions	Ratings			Unit
			min	typ	max	
[N-channel]						
Drain to Source Breakdown Voltage	$V_{(BR)DSS}$	I_D=1mA, V_{GS}=0V	60			V
Zero-Gate Voltage Drain Current	I_{DSS}	V_{DS}=60V, V_{GS}=0V			1	μA
Gate to Source Leakage Current	I_{GSS}	V_{GS}=±16V, V_{DS}=0V			±10	μA
Cutoff Voltage	$V_{GS}(off)$	V_{DS}=10V, I_D=1mA	1.2		2.6	V
Forward Transfer Admittance	| yfs |	V_{DS}=10V, I_D=2A		4.2		S
Static Drain to Source On-State Resistance	$R_{DS}(on)1$	I_D=2A, V_{GS}=10V		42	55	mΩ
	$R_{DS}(on)2$	I_D=1A, V_{GS}=4.5V		53	74	mΩ
	$R_{DS}(on)3$	I_D=1A, V_{GS}=4V		61	85	mΩ
Input Capacitance	Ciss	V_{DS}=20V, f=1MHz		955		pF
Output Capacitance	Coss			58		pF
Reverse Transfer Capacitance	Crss			45		pF
Turn-ON Delay Time	$t_d(on)$	See specified Test Circuit.		7		ns
Rise Time	t_r			8.4		ns
Turn-OFF Delay Time	$t_d(off)$			76		ns
Fall Time	t_f			23		ns
Total Gate Charge	Qg	V_{DS}=30V, V_{GS}=10V, I_D=4.7A		18		nC
Gate to Source Charge	Qgs			3		nC
Gate to Drain “Miller” Charge	Qgd			2.8		nC
Diode Forward Voltage	V_{SD}	I_S=4.7A, V_{GS}=0V		0.82	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=-1.5A		3.4		S
Static Drain to Source On-State Resistance	$R_{DS}(on)1$	I_D=-1A, V_{GS}=-10V		73	94	mΩ
	$R_{DS}(on)2$	I_D=-0.5A, V_{GS}=-4.5V		97	135	mΩ
	$R_{DS}(on)3$	I_D=-0.5A, V_{GS}=-4V		108	153	mΩ
Input Capacitance	Ciss	V_{DS}=-20V, f=1MHz		790		pF
Output Capacitance	Coss			63		pF
Reverse Transfer Capacitance	Crss			45		pF
Turn-ON Delay Time	$t_d(on)$	See specified Test Circuit.		10		ns
Rise Time	t_r			8.8		ns
Turn-OFF Delay Time	$t_d(off)$			84		ns
Fall Time	t_f			29		ns
Total Gate Charge	Qg	V_{DS}=-30V, V_{GS}=-10V, I_D=-3.5A		15		nC
Gate to Source Charge	Qgs			2.6		nC
Gate to Drain “Miller” Charge	Qgd			2.2		nC
Diode Forward Voltage	V_{SD}	I_S=-3.5A, V_{GS}=0V		-0.83	-1.2	V

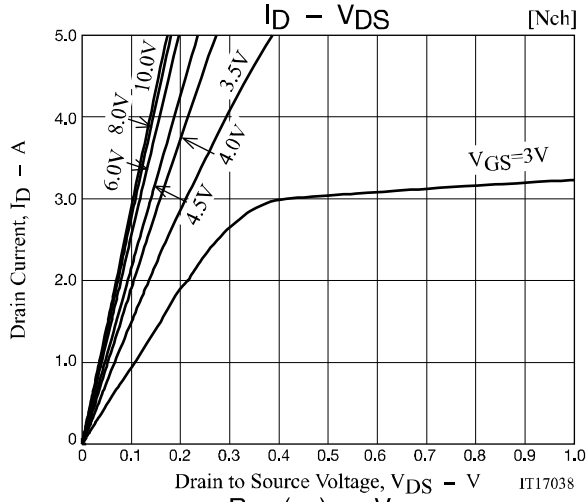
Switching Time Test Circuit

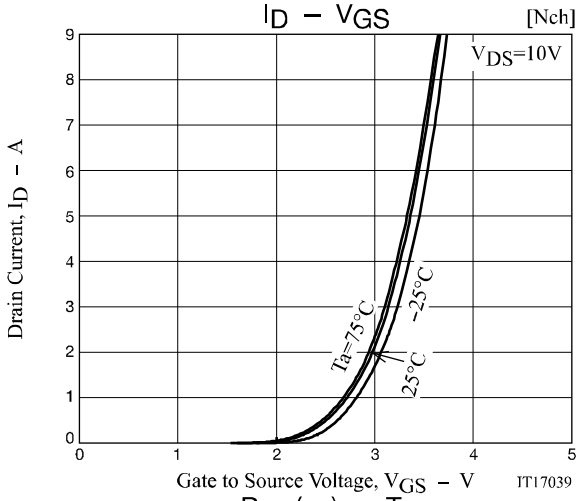
[N-channel]

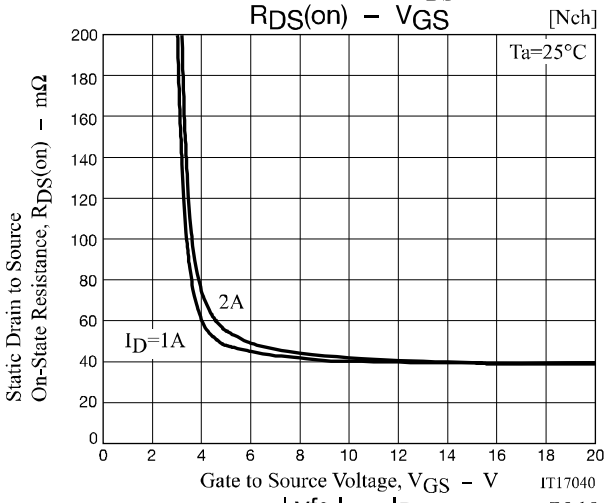


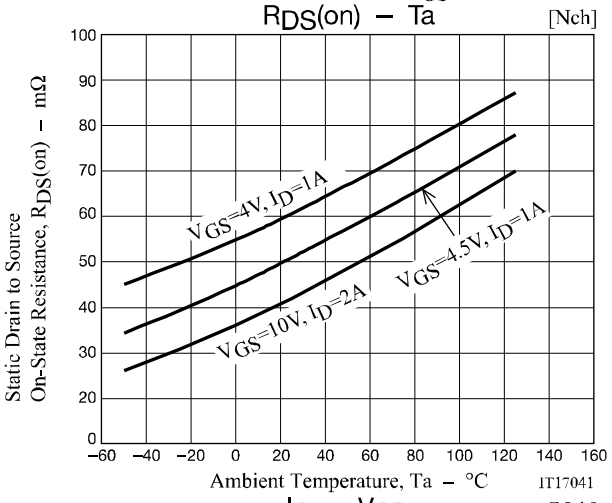
[P-channel]

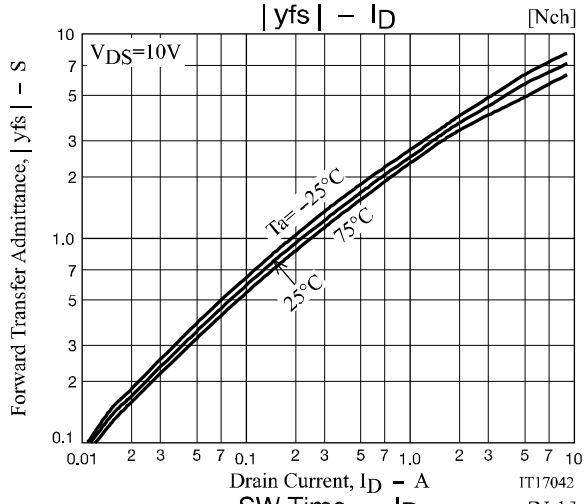


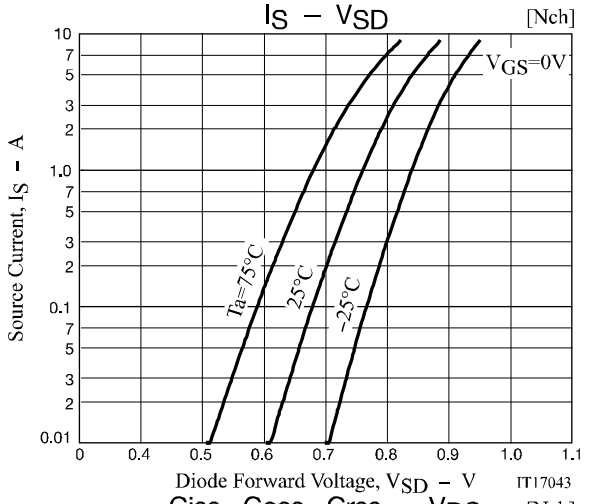

ID – VDS
[Nch]
Drain Current, ID – A
Drain to Source Voltage, VDS – V
VGS=3V
10.0V
8.0V
6.0V
4.5V
4.0V
3.5V
IT17038

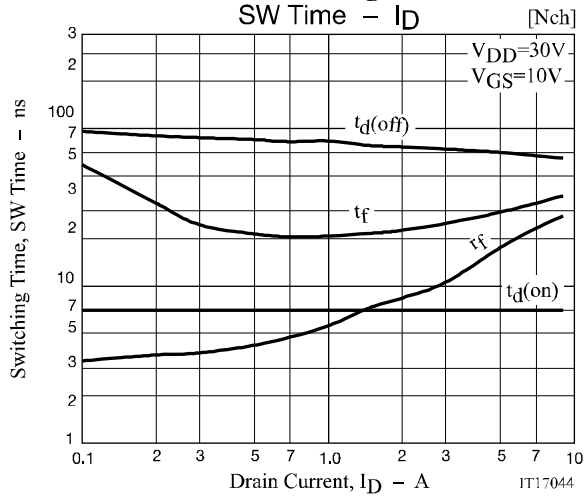

ID – VGS
[Nch]
Drain Current, ID – A
Gate to Source Voltage, VGS – V
VDS=10V
Ta=75°C
25°C
–25°C
IT17039

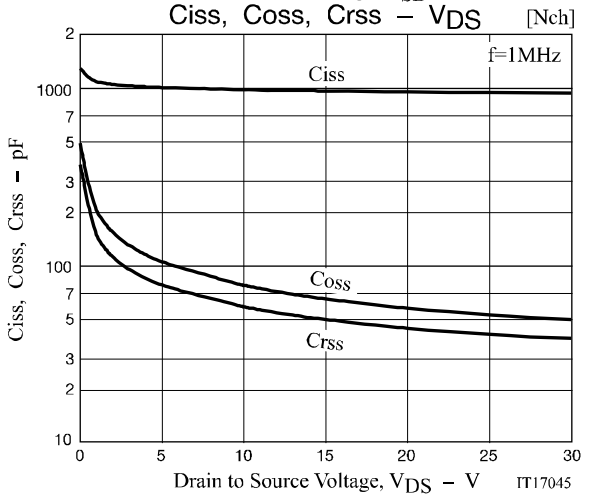

RDS(on) – VGS
[Nch]
Static Drain to Source On-State Resistance, RDS(on) – mΩ
Gate to Source Voltage, VGS – V
Ta=25°C
2A
ID=1A
IT17040

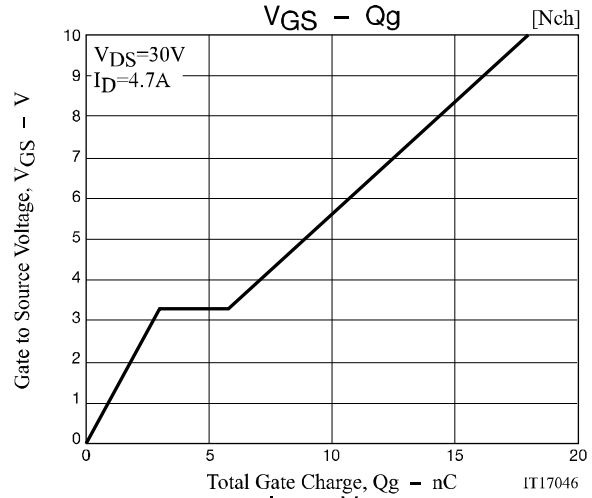

RDS(on) – Ta
[Nch]
Static Drain to Source On-State Resistance, RDS(on) – mΩ
Ambient Temperature, Ta – °C
VGS=4V, ID=1A
VGS=4.5V, ID=1A
VGS=10V, ID=2A
IT17041

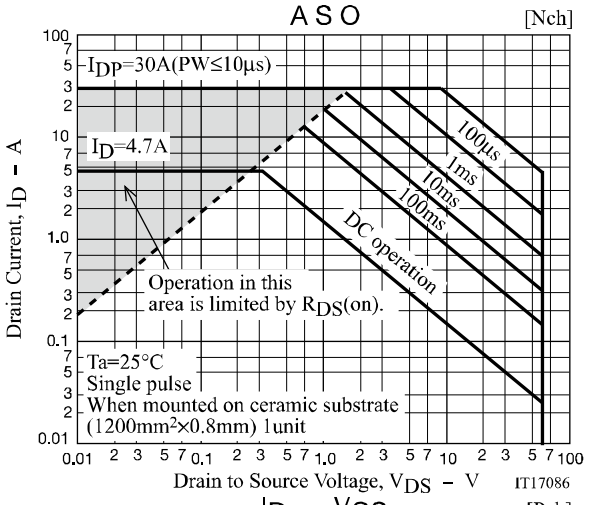

| yfs | – ID
[Nch]
Forward Transfer Admittance, | yfs | – S
Drain Current, ID – A
VDS=10V
Ta= –25°C
75°C
25°C
IT17042

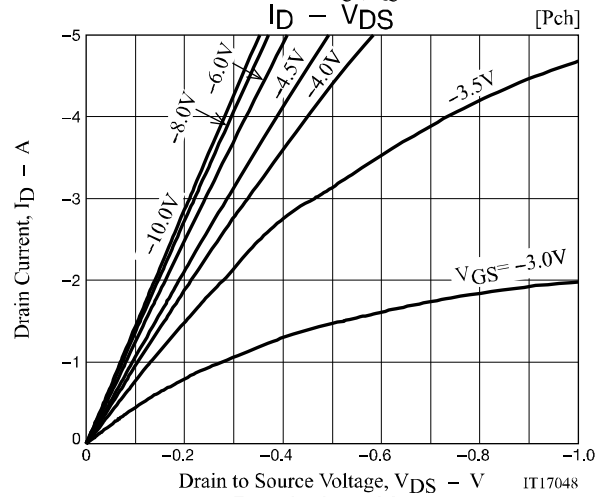

IS – VSD
[Nch]
Source Current, IS – A
Diode Forward Voltage, VSD – V
VGS=0V
Ta=75°C
25°C
–25°C
IT17043

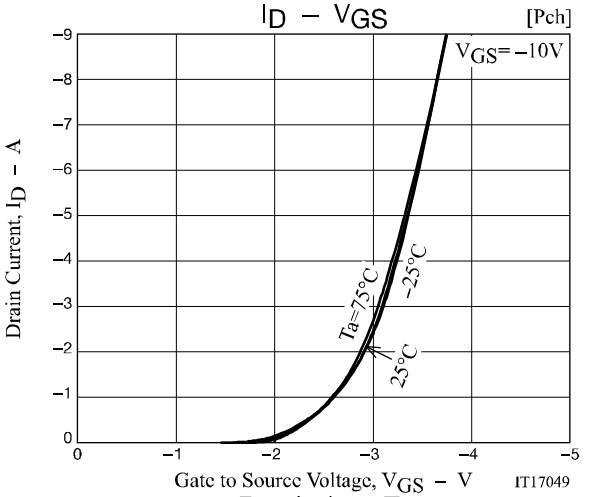

SW Time – ID
[Nch]
Switching Time, SW Time – ns
Drain Current, ID – A
VDD=30V
VGS=10V
td(off)
tf
tr
td(on)
IT17044

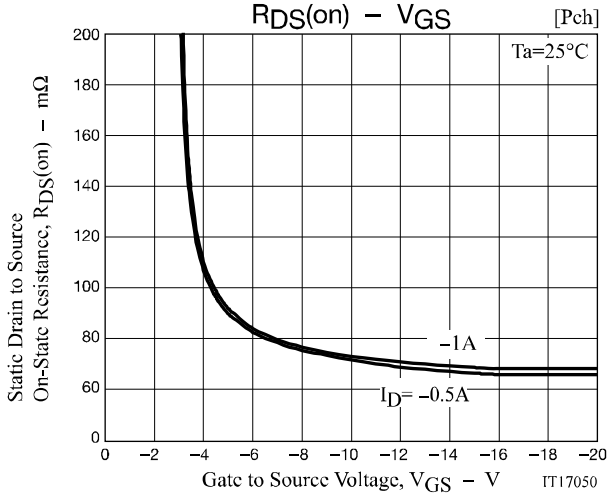

Ciss, Coss, Crss – VDS
[Nch]
Ciss, Coss, Crss – pF
Drain to Source Voltage, VDS – V
f=1MHz
Ciss
Coss
Crss
IT17045

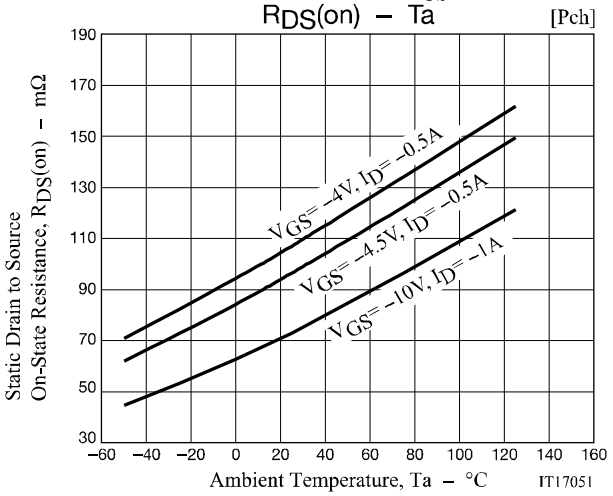

VGS – Qg
[Nch]
VDS=30V
ID=4.7A
Gate to Source Voltage, VGS – V
Total Gate Charge, Qg – nC
IT17046

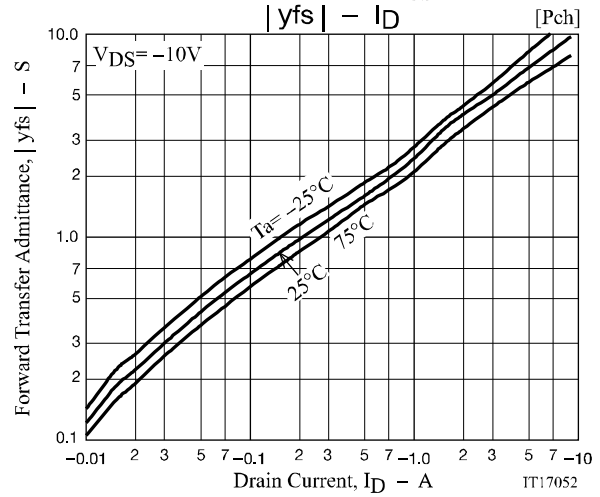

A S O
[Nch]
IDP=30A(PW≤10μs)
ID=4.7A
100μs
1ms
10ms
100ms
DC operation
Operation in this area is limited by RDS(on).
Ta=25°C
Single pulse
When mounted on ceramic substrate (1200mm²×0.8mm) 1unit
Drain Current, ID – A
Drain to Source Voltage, VDS – V
IT17086

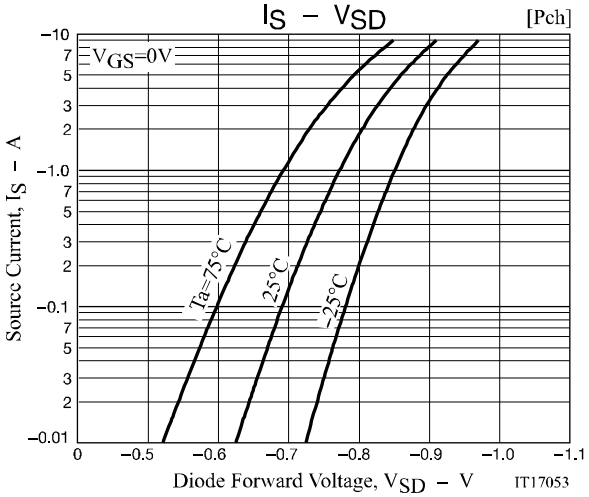

ID – VDS
[Pch]
–3.5V
–4.0V
–4.5V
–6.0V
–8.0V
–10.0V
VGS= –3.0V
Drain Current, ID – A
Drain to Source Voltage, VDS – V
IT17048

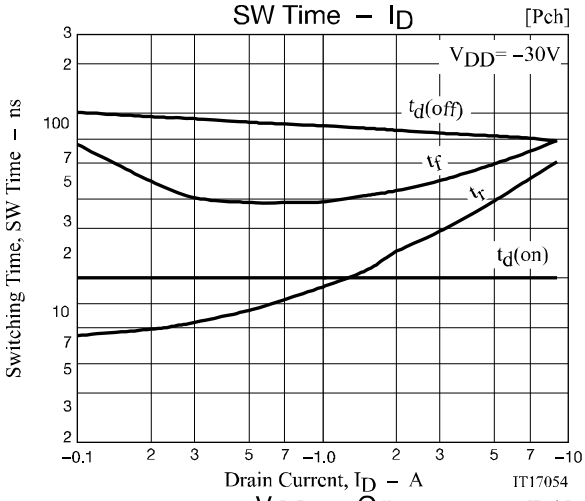

ID – VGS
[Pch]
VGS= –10V
Ta=75°C
25°C
–25°C
Drain Current, ID – A
Gate to Source Voltage, VGS – V
IT17049

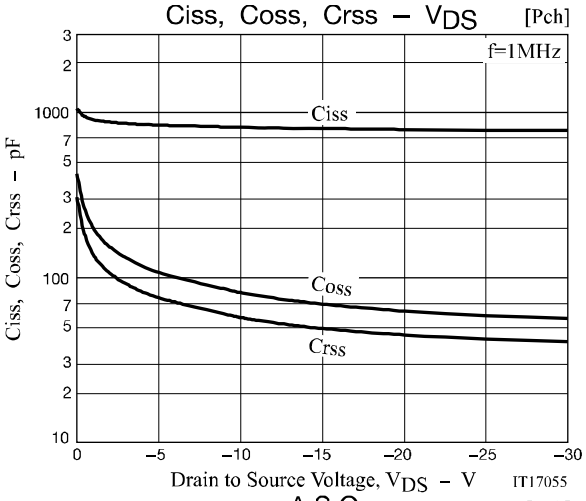

RDS(on) – VGS
[Pch]
Ta=25°C
–1A
ID= –0.5A
Static Drain to Source On-State Resistance, RDS(on) – mΩ
Gate to Source Voltage, VGS – V
IT17050

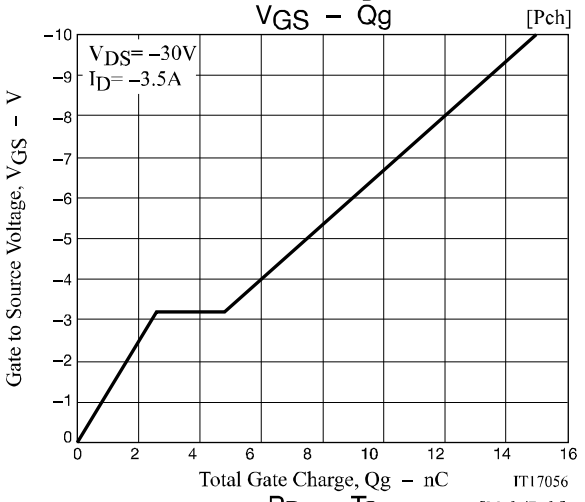

RDS(on) – Ta
[Pch]
VGS= –4V, ID= –0.5A
VGS= –4.5V, ID= –0.5A
VGS= –10V, ID= –1A
Static Drain to Source On-State Resistance, RDS(on) – mΩ
Ambient Temperature, Ta – °C
IT17051

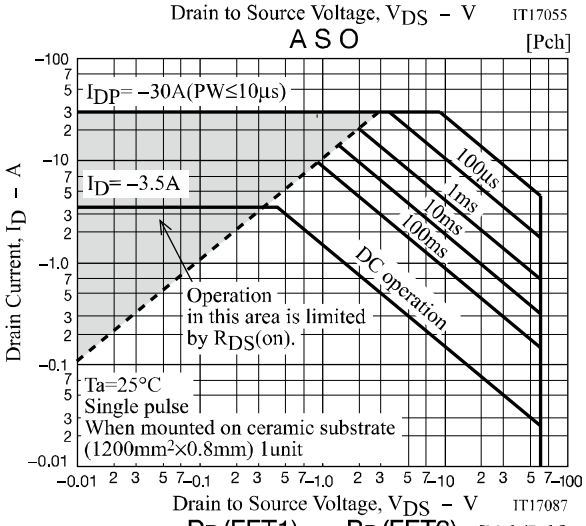

| yfs | – ID
[Pch]
VDS= –10V
Ta= –25°C
25°C
75°C
Forward Transfer Admittance, | yfs | – S
Drain Current, ID – A
IT17052

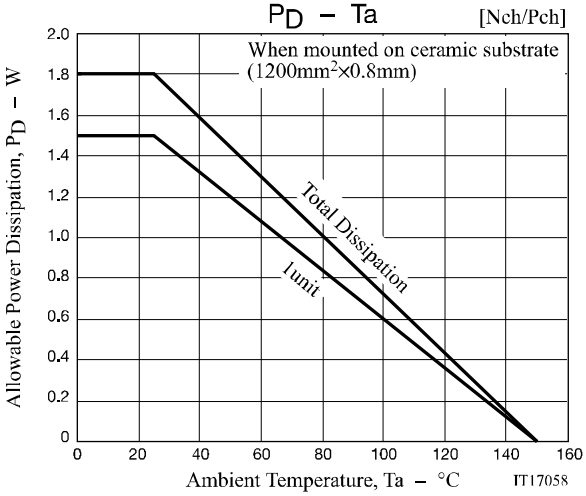

IS – VSD
[Pch]
VGS=0V
Ta=75°C
25°C
–25°C
Source Current, IS – A
Diode Forward Voltage, VSD – V
IT17053

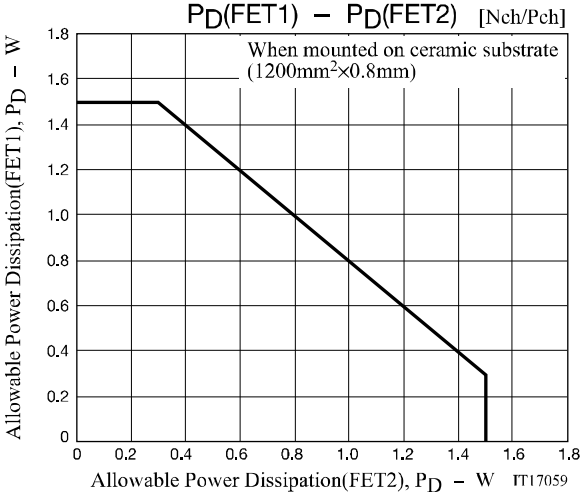

SW Time – ID
[Pch]
VDD= –30V
td(off)
tf
tr
td(on)
Switching Time, SW Time – ns
Drain Current, ID – A
IT17054


Ciss, Coss, Crss – VDS
[Pch]
f=1MHz
Ciss
Coss
Crss
Ciss, Coss, Crss – pF
Drain to Source Voltage, VDS – V
IT17055


VGS – Qg
[Pch]
VDS= –30V
ID= –3.5A
Gate to Source Voltage, VGS – V
Total Gate Charge, Qg – nC
IT17056

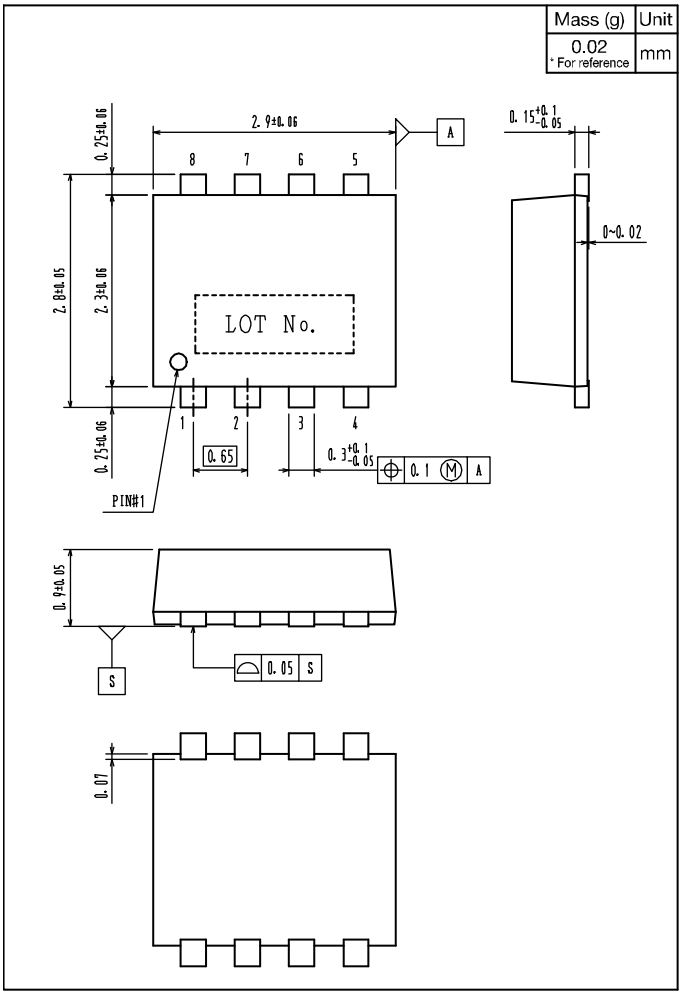

A S O
[Pch]
IDP= –30A(PW≤10μs)
ID= –3.5A
100μs
1ms
10ms
100ms
DC operation
Operation
in this area is limited
by RDS(on).
Ta=25°C
Single pulse
When mounted on ceramic substrate
(1200mm2×0.8mm) 1unit
Drain Current, ID – A
Drain to Source Voltage, VDS – V
IT17087


PD – Ta
[Nch/Pch]
When mounted on ceramic substrate
(1200mm2×0.8mm)
Total Dissipation
1unit
Allowable Power Dissipation, PD – W
Ambient Temperature, Ta – °C
IT17058

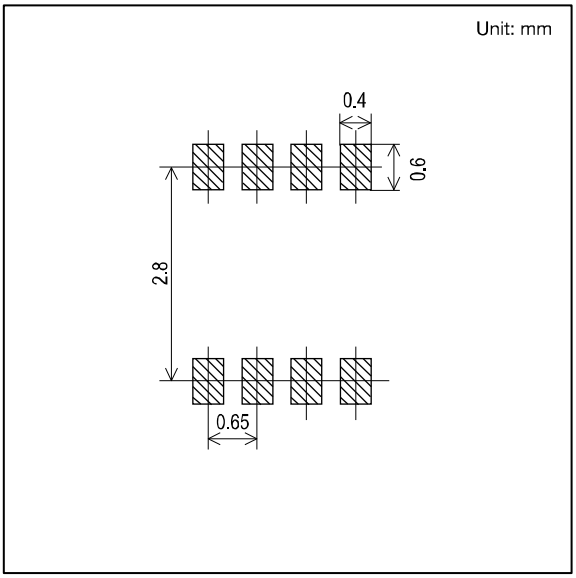

PD(FET1) – PD(FET2)
[Nch/Pch]
When mounted on ceramic substrate
(1200mm2×0.8mm)
Allowable Power Dissipation(FET1), PD – W
Allowable Power Dissipation(FET2), PD – W
IT17059

Outline Drawing

ECH8690-TL-H



Land Pattern Example



Note on usage : Since the ECH8690 is a MOSFET product, please avoid using this device in the vicinity of highly charged objects.

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