Ordering number : ENA0934

SANYO Semiconductors

DATA SHEET

N-Channel and P-Channel Silicon MOSFETs

VEC2603 — General-Purpose Switching Device Applications

Features

- A composite type of a low on-resistance P-channel MOSFET and a small signal N-channel MOSFET for driving P-channel MOSFET enables high-density mounting.
- Best suited for load switches.
- 1.8V drive.
- 0.75mm mount high.

Specifications

Absolute Maximum Ratings at Ta=25°C

Parameter	Symbol	Conditions	N-channel	P-channel	Unit
Drain-to-Source Voltage	V_{DSS}		30	−12	V
Gate-to-Source Voltage	V_{GSS}		±10	±8	V
Drain Current (DC)	I_D		0.15	−4	A
Drain Current (Pulse)	I_{DP}	PW≤10μs, duty cycle≤1%	0.6	−16	A
Allowable Power Dissipation	P_D	Mounted on a ceramic board (900mm²X0.8mm)1unit	0.9		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}=±8V, V_{DS}=0V			±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	0.15	0.22		S

Marking : BF

Continued on next page.

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

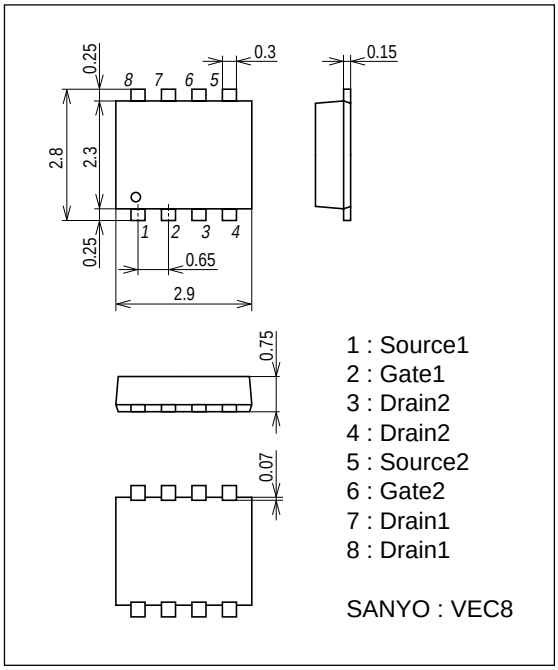
Continued from preceding page.

Parameter	Symbol	Conditions	Ratings			Unit
			min	typ	max	
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
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}=0V		0.87	1.2	V
[P-channel]						
Drain-to-Source Breakdown Voltage	$V_{(BR)DSS}$	I_D=−1mA, V_{GS}=0V	−12			V
Zero-Gate Voltage Drain Current	I_{DSS}	V_{DS}=−12V, V_{GS}=0V			−10	μA
Gate-to-Source Leakage Current	I_{GSS}	V_{GS}=±6.4V, V_{DS}=0V			±10	μA
Cutoff Voltage	$V_{GS}(off)$	V_{DS}=−6V, I_D=−1mA	−0.3		−1.0	V
Forward Transfer Admittance	$\|yfs\|$	V_{DS}=−6V, I_D=−2A	4.5	7.6		S
Static Drain-to-Source On-State Resistance	$R_{DS}(on)1$	I_D=−2A, V_{GS}=−4.5V		40	53	mΩ
	$R_{DS}(on)2$	I_D=−1A, V_{GS}=−2.5V		57	80	mΩ
	$R_{DS}(on)3$	I_D=−0.3A, V_{GS}=−1.8V		78	112	mΩ
Input Capacitance	Ciss	V_{DS}=−6V, f=1MHz		940		pF
Output Capacitance	Coss	V_{DS}=−6V, f=1MHz		230		pF
Reverse Transfer Capacitance	Crss	V_{DS}=−6V, f=1MHz		180		pF
Turn-ON Delay Time	$t_d(on)$	See specified Test Circuit.		14		ns
Rise Time	t_r	See specified Test Circuit.		120		ns
Turn-OFF Delay Time	$t_d(off)$	See specified Test Circuit.		97		ns
Fall Time	t_f	See specified Test Circuit.		110		ns
Total Gate Charge	Qg	V_{DS}=−6V, V_{GS}=−4.5V, I_D=−4A		11		nC
Gate-to-Source Charge	Qgs	V_{DS}=−6V, V_{GS}=−4.5V, I_D=−4A		1.6		nC
Gate-to-Drain “Miller” Charge	Qgd	V_{DS}=−6V, V_{GS}=−4.5V, I_D=−4A		2.8		nC
Diode Forward Voltage	V_{SD}	I_S=−4A, V_{GS}=0V		−0.85	−1.5	V

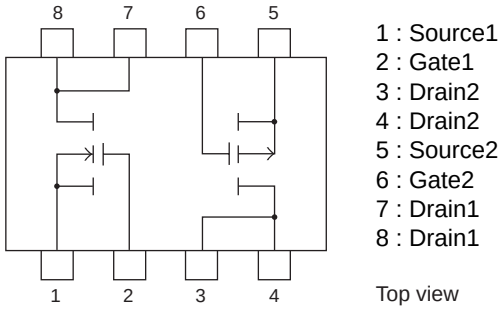
Package Dimensions

unit : mm (typ)

7012-009

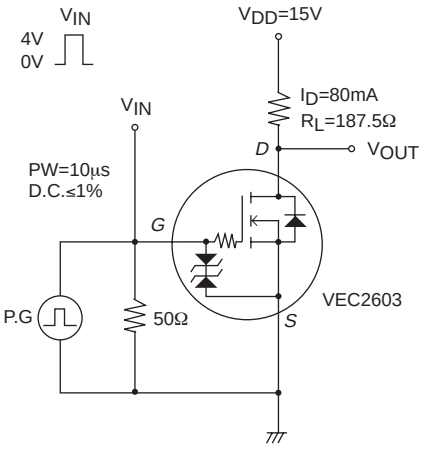


Electrical Connection

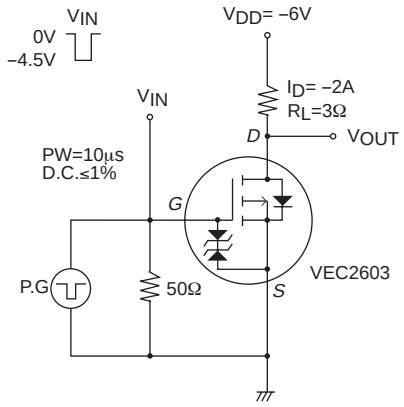


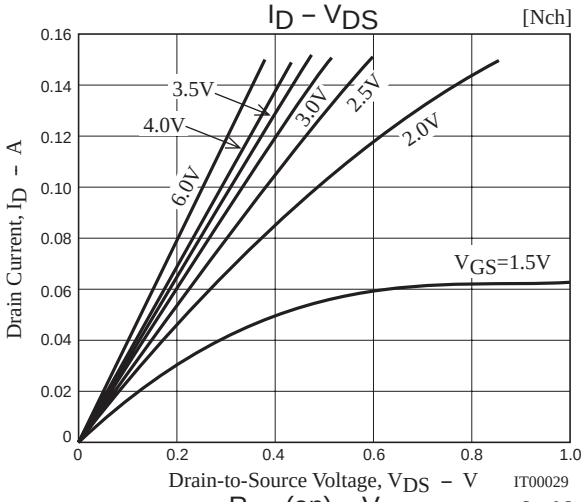
Switching Time Test Circuit

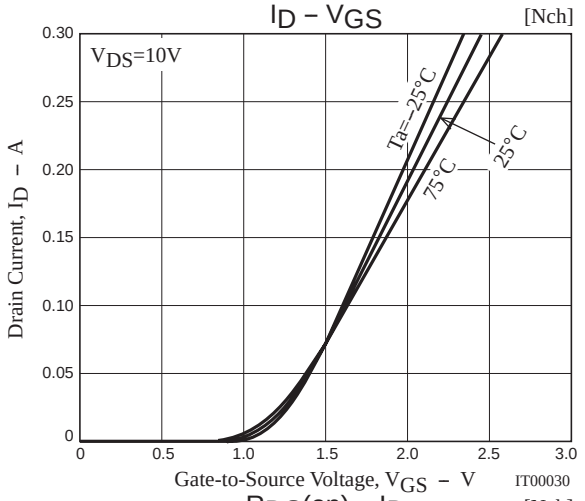
[N-channel]

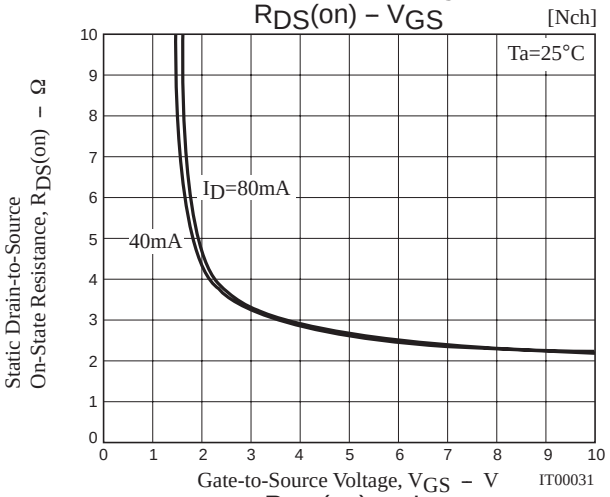


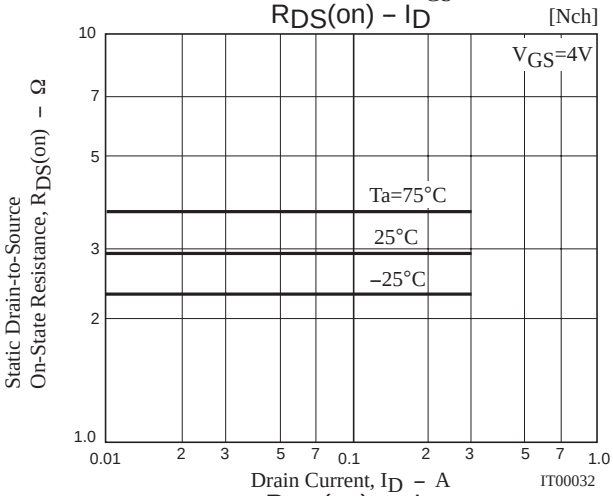
[P-channel]

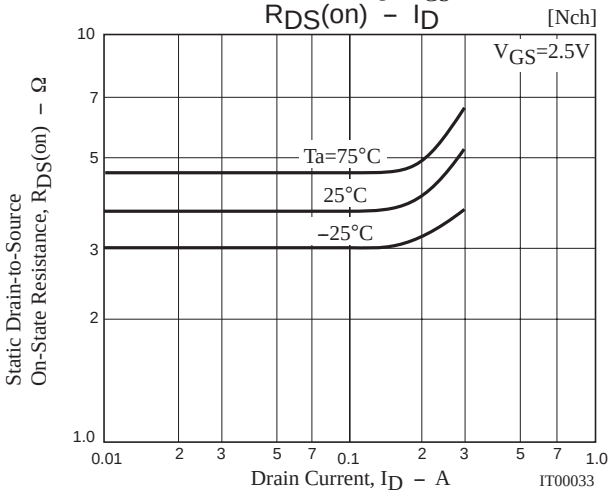


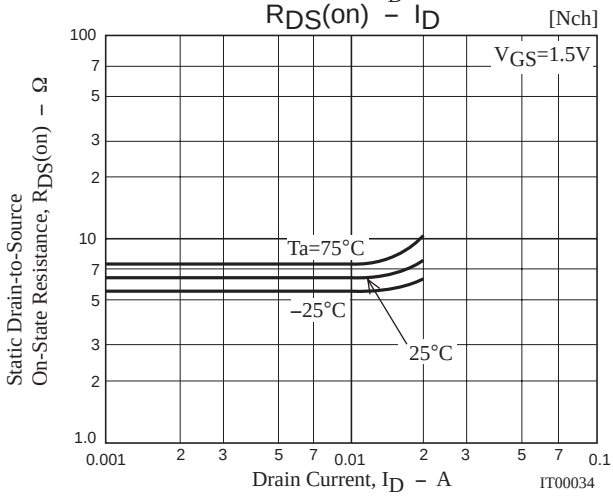


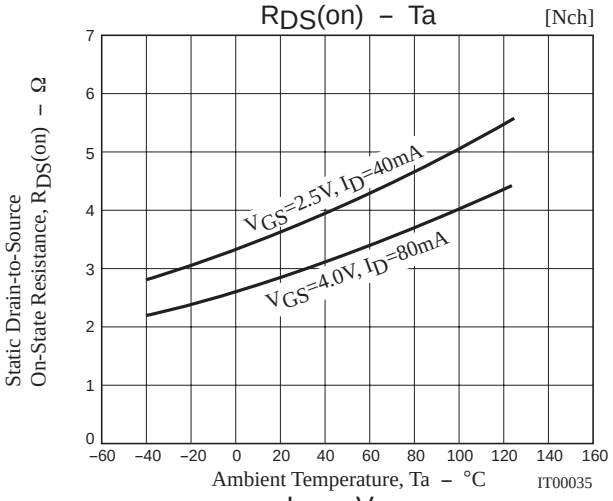


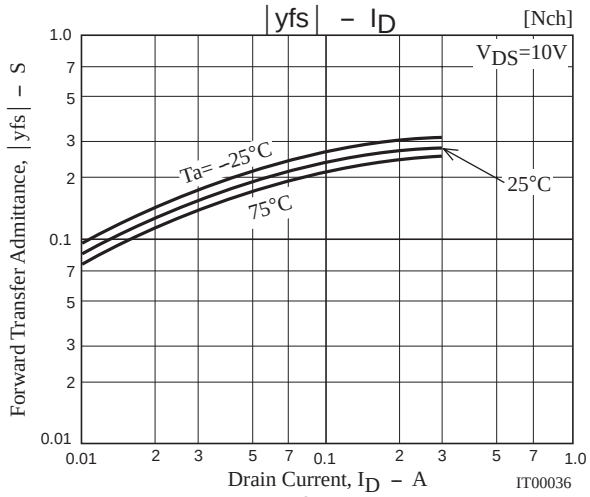


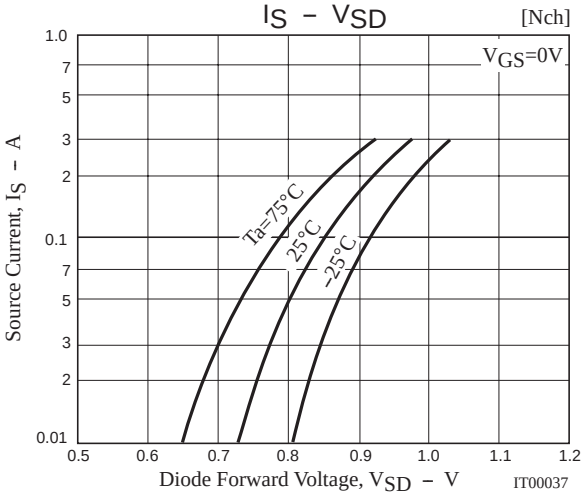


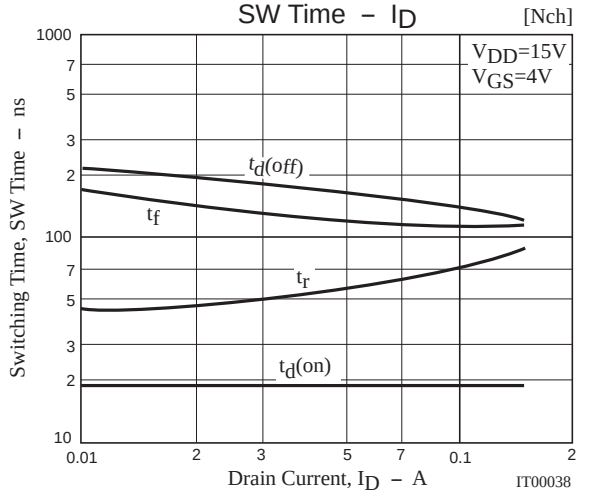


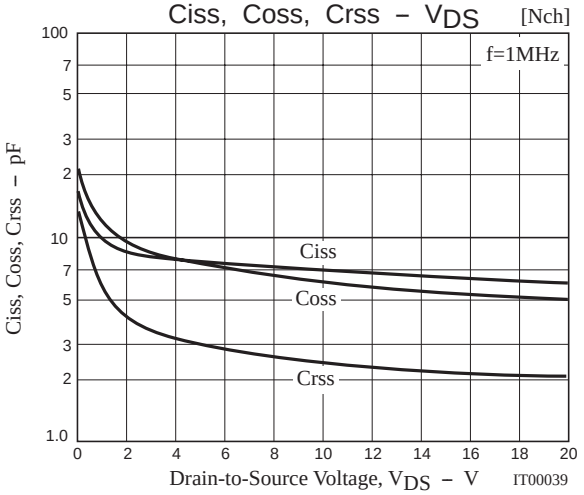


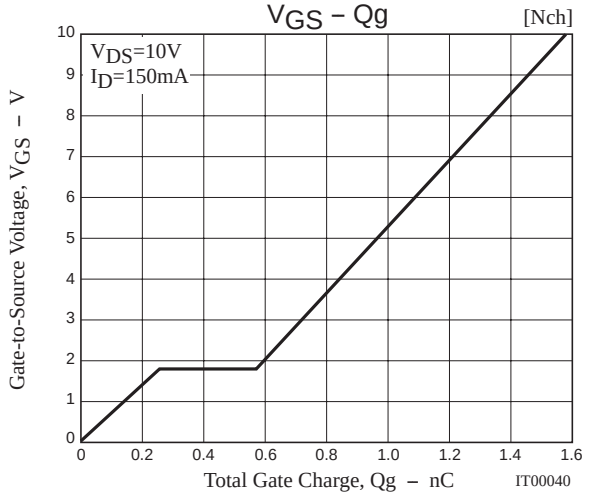

RDS(on) – Ta
[Nch]
Static Drain-to-Source On-State Resistance, RDS(on) – Ω
VGS=2.5V, ID=40mA
VGS=4.0V, ID=80mA
Ambient Temperature, Ta – °C
IT00035

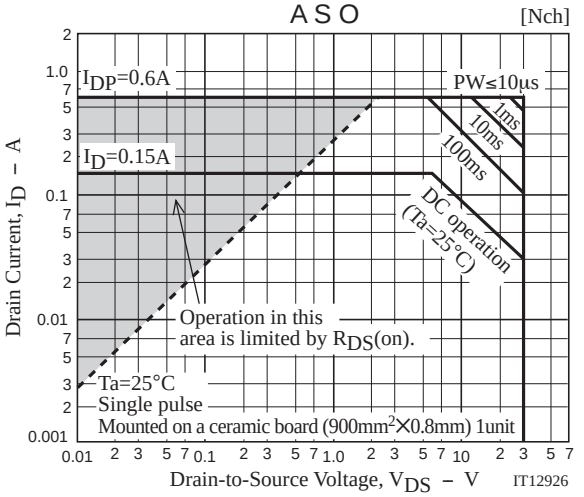

|yfs| – ID
[Nch]
VDS=10V
Ta= –25°C
75°C
25°C
Forward Transfer Admittance, |yfs| – S
Drain Current, ID – A
IT00036

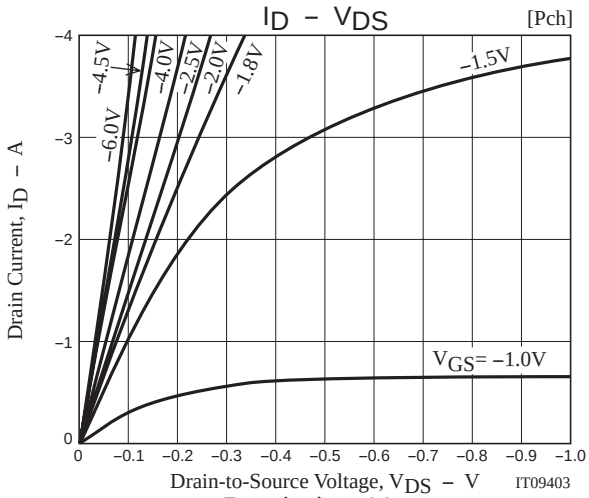

IS – VSD
[Nch]
VGS=0V
Ta=75°C
25°C
–25°C
Source Current, IS – A
Diode Forward Voltage, VSD – V
IT00037

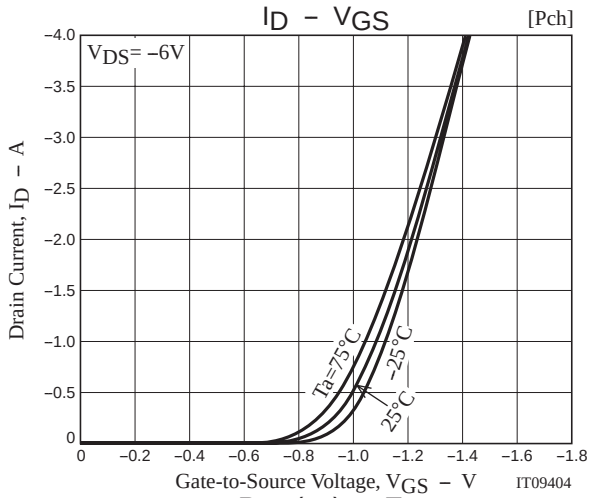

SW Time – ID
[Nch]
VDD=15V
VGS=4V
td(off)
tf
tr
td(on)
Switching Time, SW Time – ns
Drain Current, ID – A
IT00038

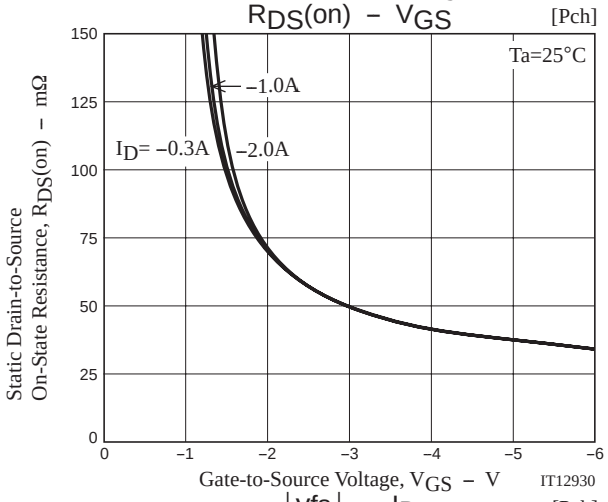

Ciss, Coss, Crss – VDS
[Nch]
f=1MHz
Ciss
Coss
Crss
Ciss, Coss, Crss – pF
Drain-to-Source Voltage, VDS – V
IT00039

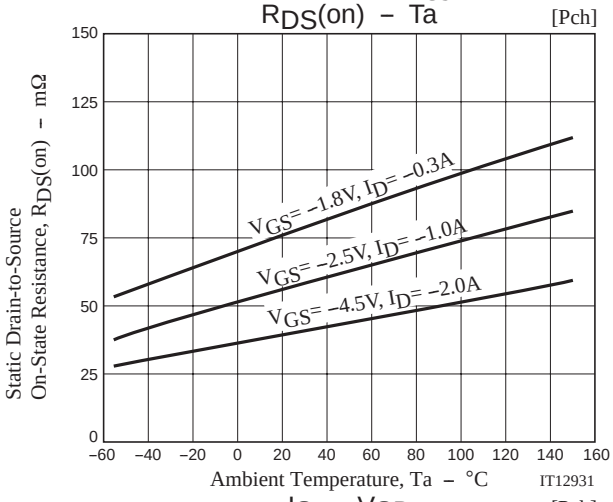

VGS – Qg
[Nch]
VDS=10V
ID=150mA
Gate-to-Source Voltage, VGS – V
Total Gate Charge, Qg – nC
IT00040

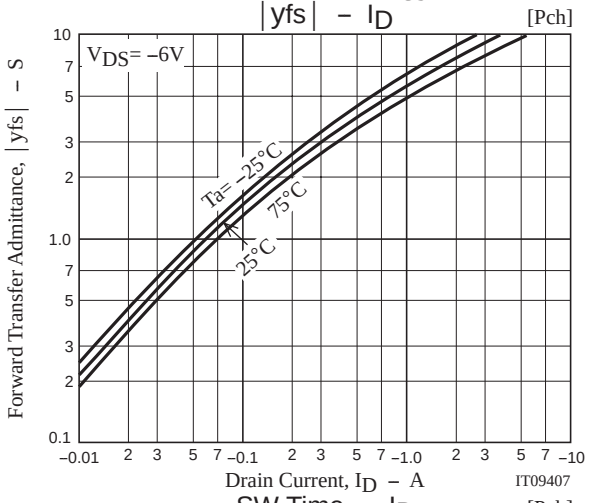

A S O
[Nch]
IDP=0.6A
PW≤10μs
1ms
10ms
100ms
DC operation (Ta=25°C)
ID=0.15A
Operation in this area is limited by RDS(on).
Ta=25°C
Single pulse
Mounted on a ceramic board (900mm2×0.8mm) 1unit
Drain Current, ID – A
Drain-to-Source Voltage, VDS – V
IT12926

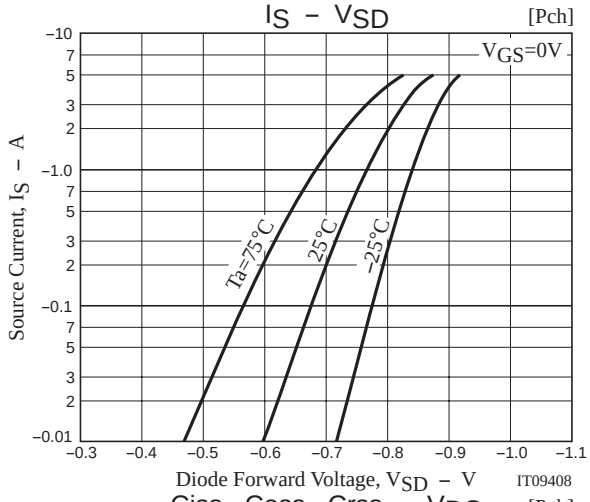

ID – VDS
[Pch]
Drain Current, ID – A
Drain-to-Source Voltage, VDS – V
IT09403
–4.5V
–6.0V
–4.0V
–2.5V
–2.0V
–1.8V
–1.5V
VGS= –1.0V

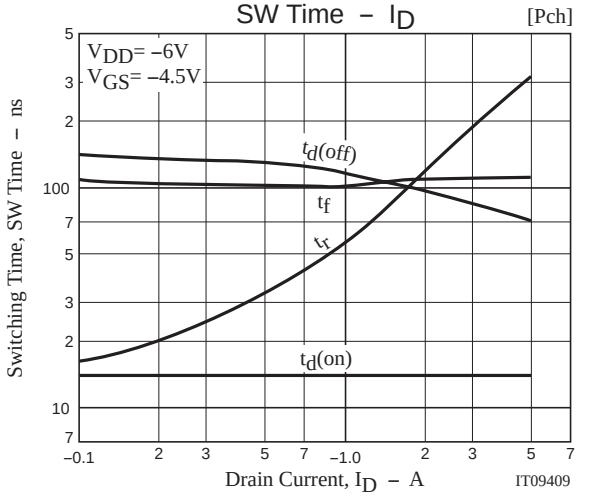

ID – VGS
[Pch]
Drain Current, ID – A
Gate-to-Source Voltage, VGS – V
IT09404
VDS= –6V
Ta=75°C
–25°C
25°C

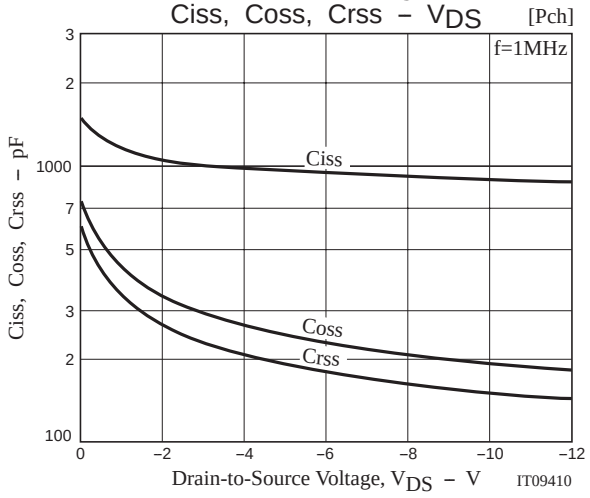

RDS(on) – VGS
[Pch]
Static Drain-to-Source On-State Resistance, RDS(on) – mΩ
Gate-to-Source Voltage, VGS – V
IT12930
Ta=25°C
–1.0A
ID= –0.3A
–2.0A

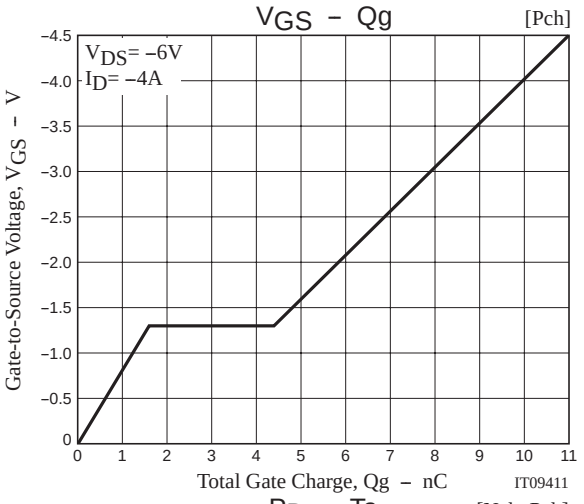

RDS(on) – Ta
[Pch]
Static Drain-to-Source On-State Resistance, RDS(on) – mΩ
Ambient Temperature, Ta – °C
IT12931
VGS= –1.8V, ID= –0.3A
VGS= –2.5V, ID= –1.0A
VGS= –4.5V, ID= –2.0A

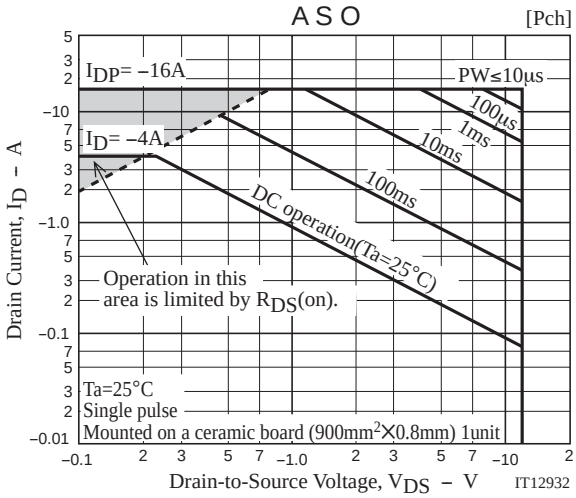

|yfs| – ID
[Pch]
Forward Transfer Admittance, |yfs| – S
Drain Current, ID – A
IT09407
VDS= –6V
Ta= –25°C
75°C
25°C

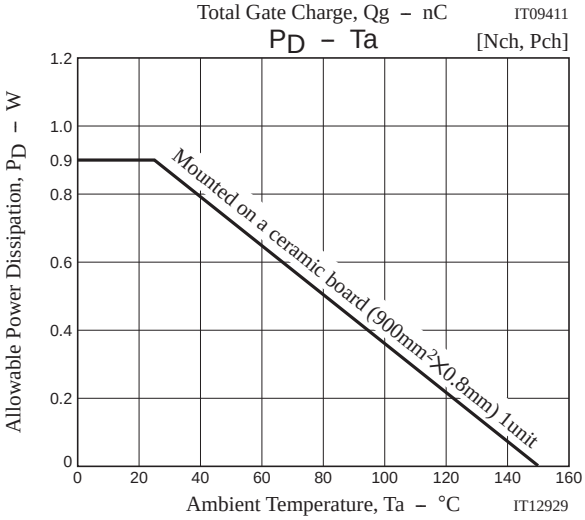

IS – VSD
[Pch]
Source Current, IS – A
Diode Forward Voltage, VSD – V
IT09408
VGS=0V
Ta=75°C
25°C
–25°C


SW Time – ID
[Pch]
Switching Time, SW Time – ns
Drain Current, ID – A
IT09409
VDD= –6V
VGS= –4.5V
td(off)
tf
tr
td(on)


Ciss, Coss, Crss – VDS
[Pch]
Ciss, Coss, Crss – pF
Drain-to-Source Voltage, VDS – V
IT09410
f=1MHz
Ciss
Coss
Crss







Note on usage : Since the VEC2603 is a MOSFET product, please avoid using this device in the vicinity of highly charged objects.