Ordering number : ENA1158

SANYO Semiconductors

DATA SHEET

VEC2904 — General-Purpose Switching Device Applications

PNP Epitaxial Planar Silicon Transistor
P-Channel Silicon MOSFET

Features

- Composite type, facilitating high-density mounting.
- Mounting height 0.75mm.

Specifications

Absolute Maximum Ratings at Ta=25°C

Parameter	Symbol	Conditions	Ratings	Unit
[TR]				
Collector-to-Base Voltage	V_{CBO}		−30	V
Collector-to-Emitter Voltage	V_{CEO}		−30	V
Emitter-to-Collector Voltage	V_{ECO}		−6.5	V
Emitter-to-Base Voltage	V_{EBO}		−5	V
Collector Current	I_C		−3	A
Collector Current (Pulse)	I_{CP}		−5	A
Base Current	I_B		−600	mA
Collector Dissipation	P_C	When mounted on ceramic substrate (900mm²×0.8mm) 1unit	1.1	W
Junction Temperature	Tj		150	°C
Storage Temperature	Tstg		−55 to +150	°C
[FET]				
Drain-to-Source Voltage	V_{DSS}		−12	V
Gate-to-Source Voltage	V_{GSS}		±8	V
Drain Current (DC)	I_D		−4	A
Drain Current (Pulse)	I_{DP}	PW≤10μs, duty cycle≤1%	−16	A
Allowable Power Dissipation	P_D	When mounted on ceramic substrate (900mm²×0.8mm) 1unit	1.1	W
Channel Temperature	Tch		150	°C
Storage Temperature	Tstg		−55 to +150	°C

Marking : AH

SANYO Semiconductor Co., Ltd.
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Electrical Characteristics at Ta=25°C

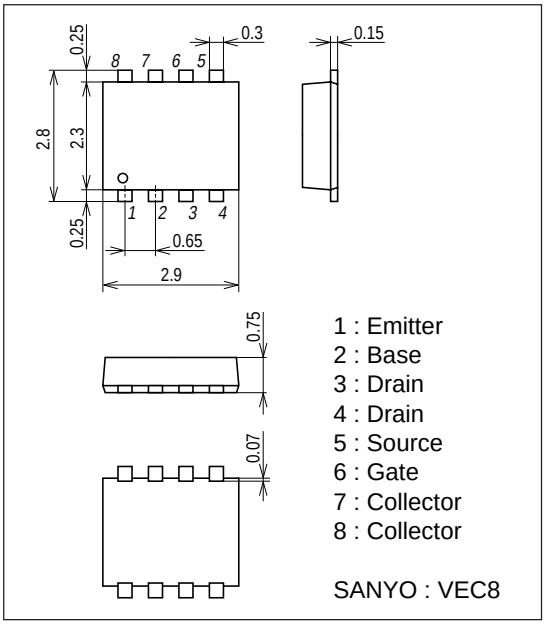
Parameter	Symbol	Conditions	Ratings			Unit
			min	typ	max	
[TR]						
Collector Cutoff Current	I_{CBO}	V_{CB}=−30V, I_E=0A			−0.1	μA
Emitter Cutoff Current	I_{EBO}	V_{EB}=−4V, I_C=0A			−0.1	μA
DC Current Gain	h_{FE}	V_{CE}=−2V, I_C=−500mA	200		560	
Gain-Bandwidth Product	f_T	V_{CE}=−10V, I_C=−500mA		380		MHz
Output Capacitance	Cob	V_{CB}=−10V, f=1MHz		25		pF
Collector-to-Emitter Saturation Voltage	V_{CE}(sat)1	I_C=−1.5A, I_B=−30mA		−160	−235	mV
	V_{CE}(sat)2	I_C=−1.5A, I_B=−75mA		−110	−160	mV
Base-to-Emitter Saturation Voltage	V_{BE}(sat)	I_C=−1.5A, I_B=−30mA		−0.83	−1.2	V
Collector-to-Base Breakdown Voltage	$V_{(BR)CBO}$	I_C=−10μA, I_E=0A	−30			V
Collector-to-Emitter Breakdown Voltage	$V_{(BR)CEO}$	I_C=−1mA, R_{BE}=∞	−30			V
Emitter-to-Collector Breakdown Voltage	$V_{(BR)ECO}$	I_C=−10μA, R_{CB}=∞	−6.5			V
Emitter-to-Base Breakdown Voltage	$V_{(BR)EBO}$	I_E=−10μA, I_C=0A	−5			V
Turn-ON Time	t_{on}	See specified Test Circuit.		50		ns
Storage Time	t_{stg}	See specified Test Circuit.		270		ns
Fall Time	t_f	See specified Test Circuit.		25		ns
[FET]						
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		37	49	mΩ
	R_{DS}(on)2	I_D=−1A, V_{GS}=−2.5V		54	75	mΩ
	R_{DS}(on)3	I_D=−0.3A, V_{GS}=−1.8V		76	107	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	−1.2	V

Note : The specifications shown above are for each individual transistor.

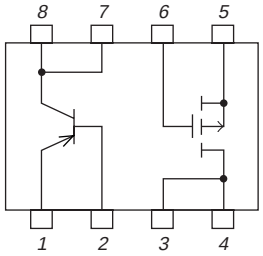
Package Dimensions

unit : mm (typ)

7012-010



Electrical Connection

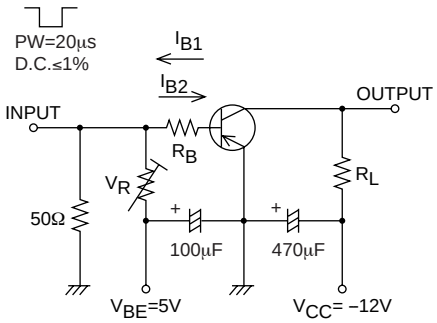


1 : Emitter
2 : Base
3 : Drain
4 : Drain
5 : Source
6 : Gate
7 : Collector
8 : Collector

Top view

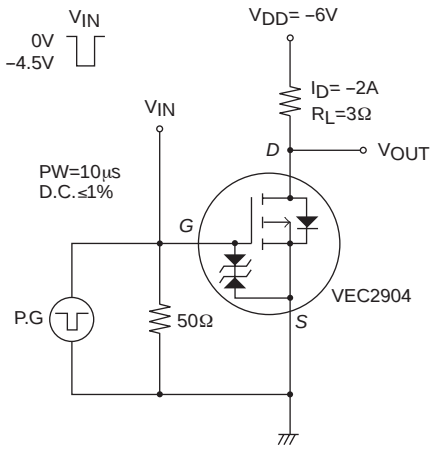
Switching Time Test Circuit

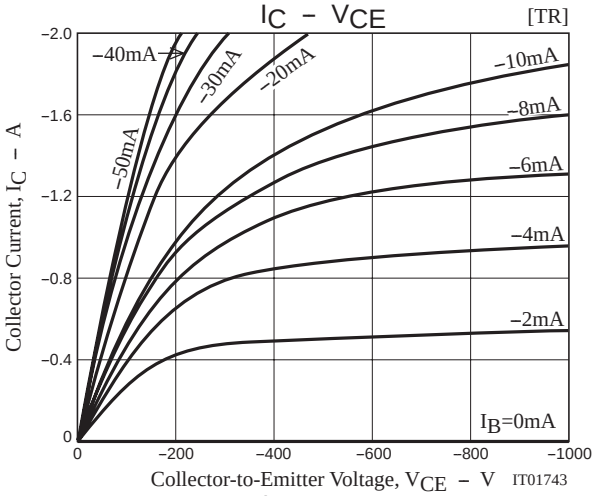
[TR]

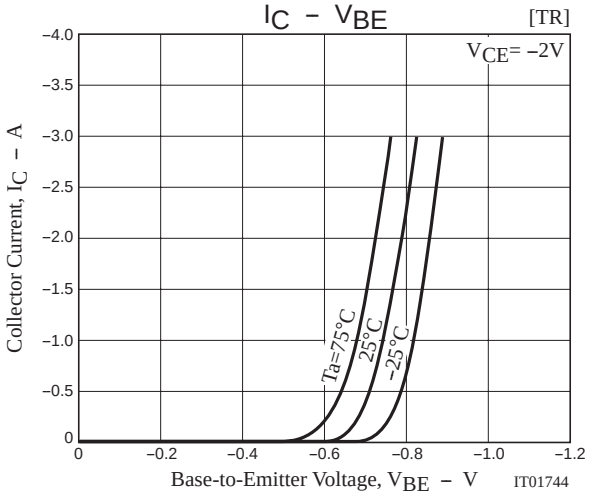


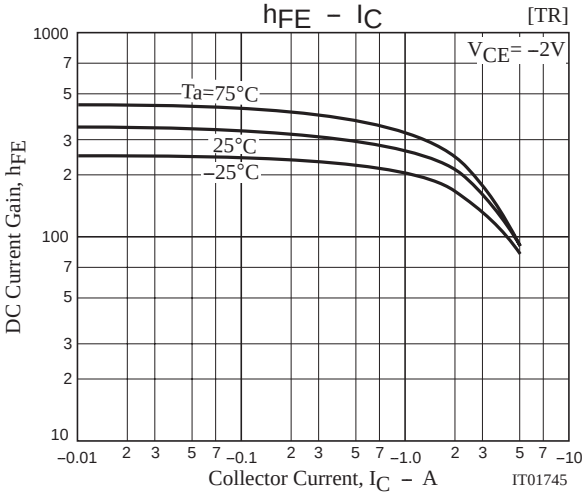
I_C=20I_{B1}=−20I_{B2}=500mA

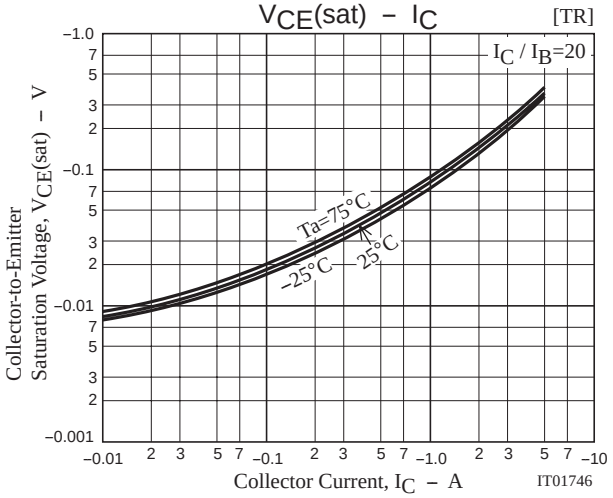
[FET]

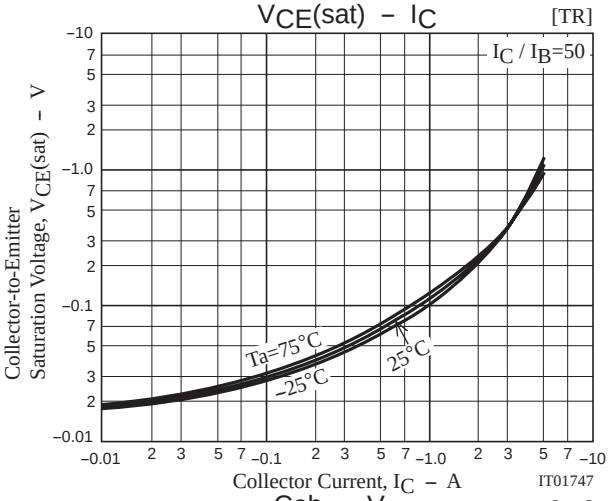


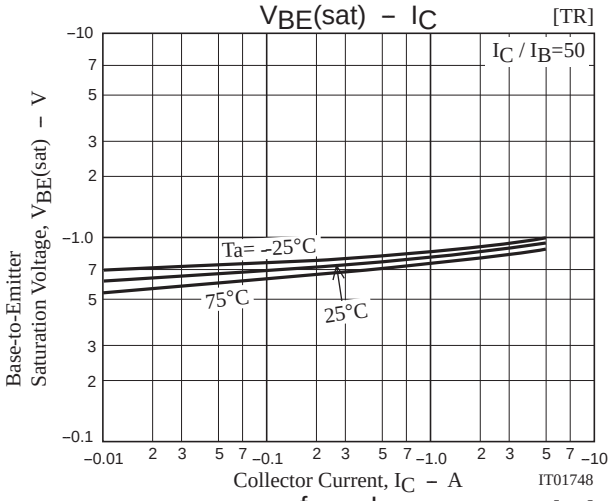


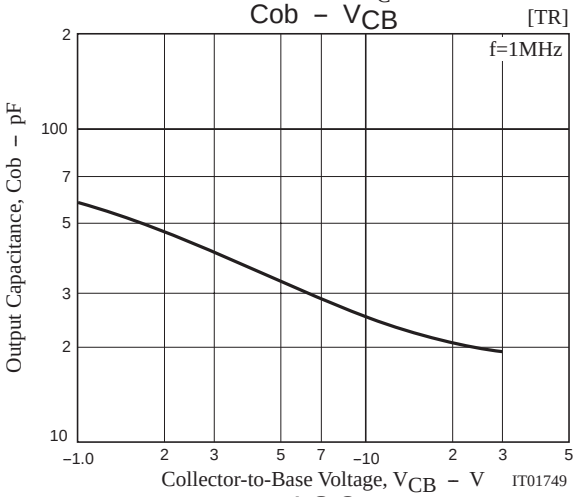


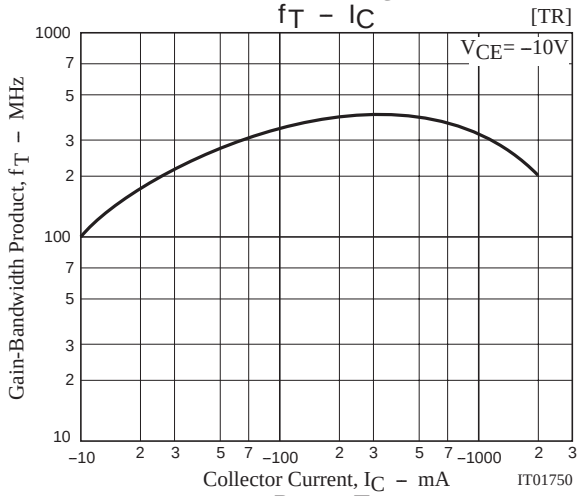


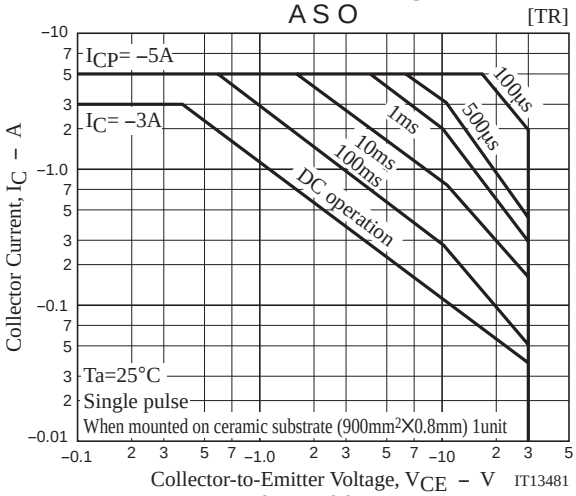


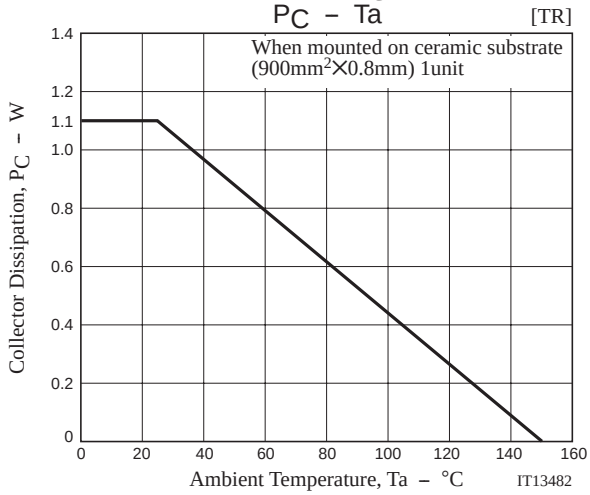

VCE(sat) – IC
[TR]
IC / IB=50
Collector-to-Emitter Saturation Voltage, VCE(sat) – V
Ta=75°C
25°C
–25°C
Collector Current, IC – A
IT01747

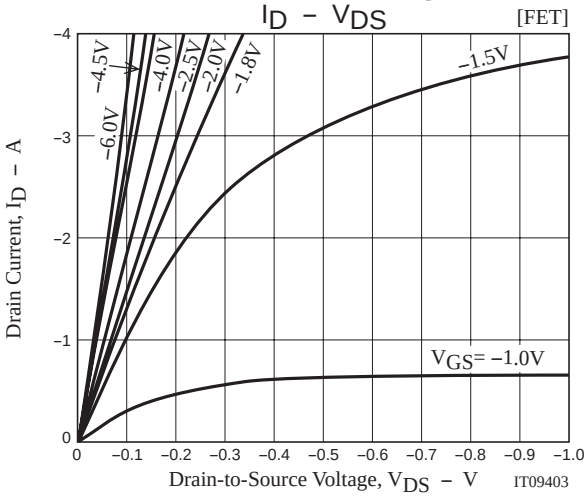

VBE(sat) – IC
[TR]
IC / IB=50
Base-to-Emitter Saturation Voltage, VBE(sat) – V
Ta= –25°C
75°C
25°C
Collector Current, IC – A
IT01748

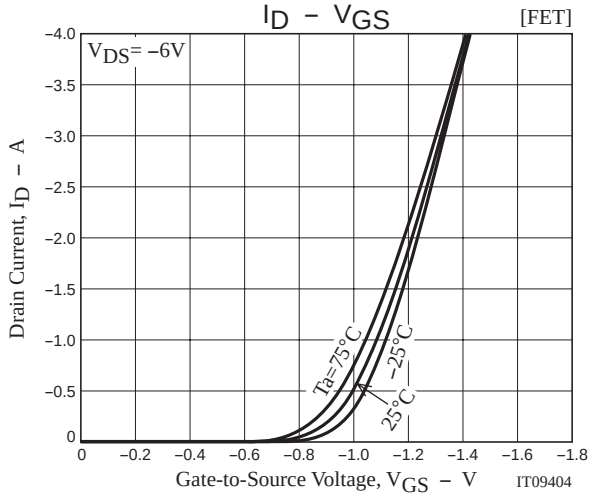

Cob – VCB
[TR]
f=1MHz
Output Capacitance, Cob – pF
Collector-to-Base Voltage, VCB – V
IT01749

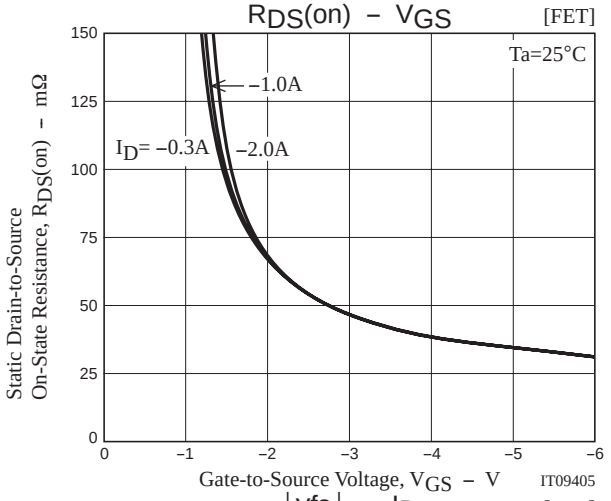

fT – IC
[TR]
VCE= –10V
Gain-Bandwidth Product, fT – MHz
Collector Current, IC – mA
IT01750

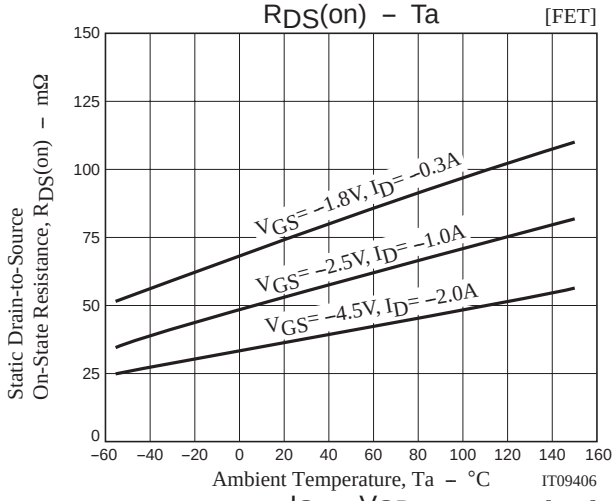

ASO
[TR]
ICP= –5A
IC= –3A
100µs
500µs
1ms
10ms
100ms
DC operation
Ta=25°C
Single pulse
When mounted on ceramic substrate (900mm2×0.8mm) 1unit
Collector Current, IC – A
Collector-to-Emitter Voltage, VCE – V
IT13481

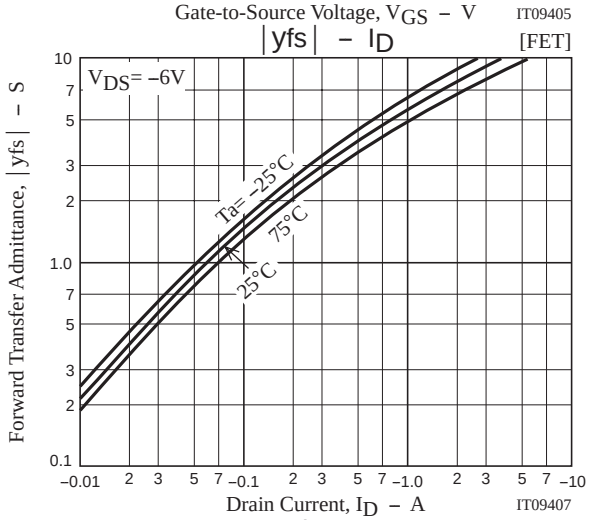

PC – Ta
[TR]
When mounted on ceramic substrate (900mm2×0.8mm) 1unit
Collector Dissipation, PC – W
Ambient Temperature, Ta – °C
IT13482

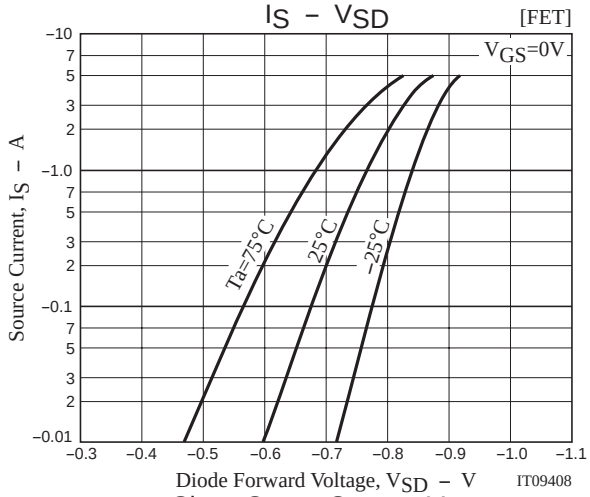

ID – VDS
[FET]
–4.5V
–6.0V
–4.0V
–2.5V
–2.0V
–1.8V
–1.5V
VGS= –1.0V
Drain Current, ID – A
Drain-to-Source Voltage, VDS – V
IT09403

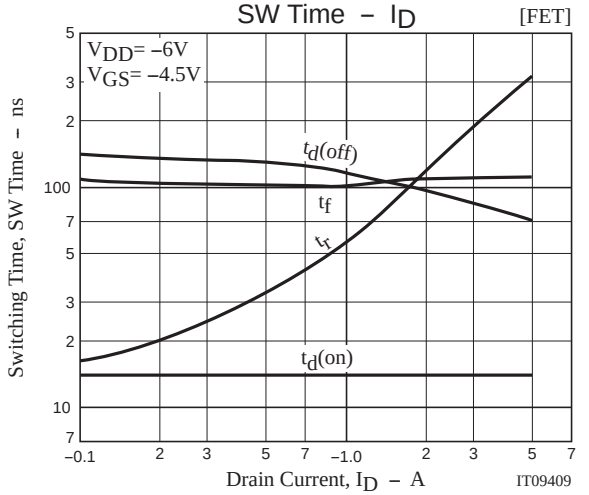

ID – VGS
[FET]
VDS= –6V
Ta=75°C
–25°C
25°C
Drain Current, ID – A
Gate-to-Source Voltage, VGS – V
IT09404

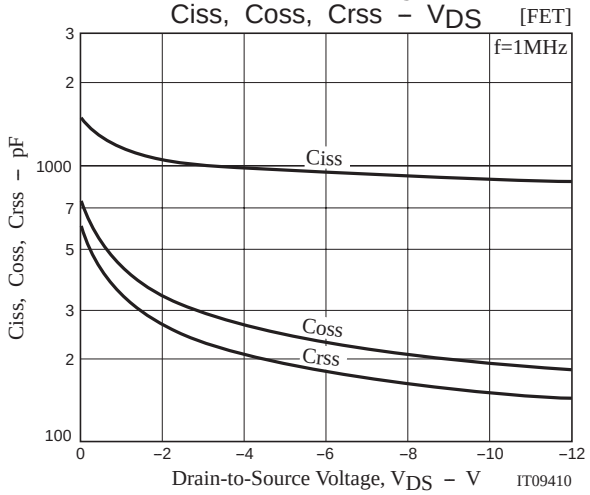

RDS(on) – VGS
[FET]
Ta=25°C
–1.0A
ID= –0.3A
–2.0A
Static Drain-to-Source On-State Resistance, RDS(on) – mΩ
Gate-to-Source Voltage, VGS – V
IT09405

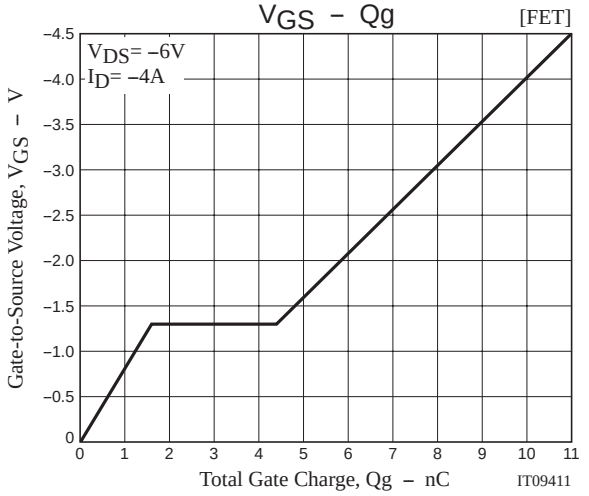

RDS(on) – Ta
[FET]
VGS= –1.8V, ID= –0.3A
VGS= –2.5V, ID= –1.0A
VGS= –4.5V, ID= –2.0A
Static Drain-to-Source On-State Resistance, RDS(on) – mΩ
Ambient Temperature, Ta – °C
IT09406

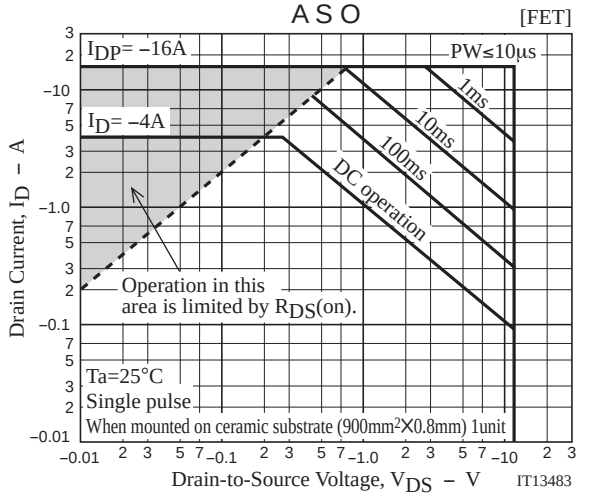

|yfs| – ID
[FET]
VDS= –6V
Ta= –25°C
25°C
75°C
Forward Transfer Admittance, |yfs| – S
Drain Current, ID – A
IT09407

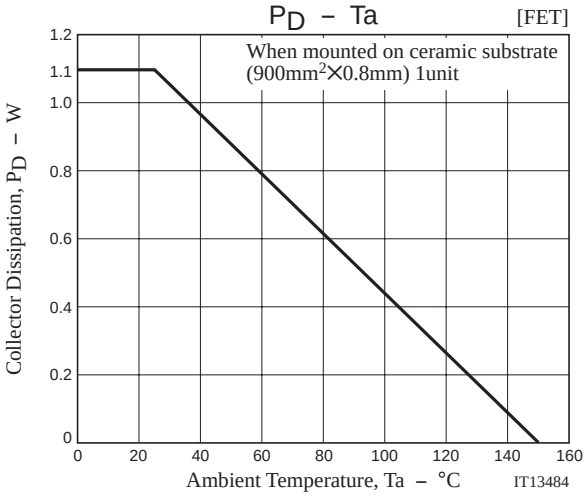

IS – VSD
[FET]
VGS=0V
Ta=75°C
25°C
–25°C
Source Current, IS – A
Diode Forward Voltage, VSD – V
IT09408


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


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


VGS – Qg
[FET]
VDS= –6V
ID= –4A
Gate-to-Source Voltage, VGS – V
Total Gate Charge, Qg – nC
IT09411


A S O
[FET]
IDP= –16A
PW≤10μs
ID= –4A
1ms
10ms
100ms
DC operation
Operation in this area is limited by RDS(on).
Ta=25°C
Single pulse
When mounted on ceramic substrate (900mm²X0.8mm) 1unit
Drain Current, ID – A
Drain-to-Source Voltage, VDS – V
IT13483



Note on usage : Since the VEC2904 is a MOSFET product, please avoid using this device in the vicinity of highly charged objects.