



# SANYO Semiconductors

## DATA SHEET

# VEC2901

TR : NPN Epitaxial Planar Silicon Transistor

FET : N-Channel Silicon MOSFET

## Switching, Flash Applications

### Features

- Composite type with an NPN transistor and N-ch MOS-FET contained in one package facilitating high-density mounting.
- Ultrasmall package permitting applied sets to be made small and slim.

### Specifications

**Absolute Maximum Ratings** at  $T_a=25^\circ\text{C}$ 

Parameter	Symbol	Conditions	Ratings	Unit
[TR]				
Collector-to-Base Voltage	$V_{CB0}$		100	V
Collector-to-Emitter Voltage	$V_{CE0}$		50	V
Emitter-to-Base Voltage	$V_{EB0}$		6	V
Collector Current	$I_C$		5	A
Collector Current (Pulse)	$I_{CP}$		8	A
Collector Dissipation	$P_C$	Mounted on a ceramic board (900mm <sup>2</sup> X0.8mm) 1unit	1.1	W
Junction Temperature	$T_j$		150	$^\circ\text{C}$
Storage Temperature	$T_{stg}$		-55 to +150	$^\circ\text{C}$
[FET]				
Drain-to-Source Voltage	$V_{DSS}$		30	V
Gate-to-Source Voltage	$V_{GSS}$		$\pm 10$	V
Drain Current	$I_D$		150	mA
Drain Current (Pulse)	$I_{DP}$	$PW \leq 10\mu\text{s}$ , duty cycle $\leq 1\%$	600	mA
Allowable Power Dissipation	$P_D$		0.25	W
Channel Temperature	$T_{ch}$		150	$^\circ\text{C}$
Storage Temperature	$T_{stg}$		-55 to +150	$^\circ\text{C}$

**Electrical Characteristics** at  $T_a=25^\circ\text{C}$ 

Parameter	Symbol	Conditions	Ratings			Unit
			min	typ	max	
[TR]						
Collector Cutoff Current	$I_{CBO}$	$V_{CB}=40\text{V}$ , $I_E=0$			100	nA
Emitter Cutoff Current	$I_{EBO}$	$V_{EB}=4\text{V}$ , $I_C=0$			100	nA
DC Current Gain	$h_{FE}$	$V_{CE}=2\text{V}$ , $I_C=500\text{mA}$	250		400	
Gain-Bandwidth Product	$f_T$	$V_{CE}=10\text{V}$ , $I_C=500\text{mA}$		330		MHz
Output Capacitance	$C_{ob}$	$V_{CB}=10\text{V}$ , $f=1\text{MHz}$		26		pF
Collector-to-Emitter Saturation Voltage	$V_{CE(sat)1}$	$I_C=1.6\text{A}$ , $I_B=53\text{mA}$		55	110	mV
	$V_{CE(sat)2}$	$I_C=2\text{A}$ , $I_B=40\text{mA}$		75	150	mV

Marking : AA

Continued on next page.

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**SANYO Electric Co.,Ltd. Semiconductor Company**

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# VEC2901

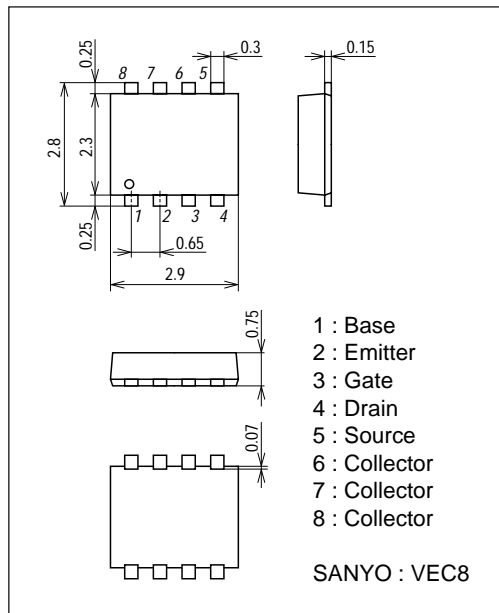
Continued from preceding page.

Parameter	Symbol	Conditions	Ratings			Unit
			min	typ	max	
Base-to-Emitter Saturation Voltage	$V_{BE(sat)}$	$I_C=2A, I_B=40mA$		0.9	1.2	V
Collector-to-Base Breakdown Voltage	$V_{(BR)CBO}$	$I_C=10\mu A, I_E=0$	100			V
Collector-to-Emitter Breakdown Voltage	$V_{(BR)CEO}$	$I_C=1mA, R_{BE}=\infty$	50			V
Emitter-to-Base Breakdown Voltage	$V_{(BR)EBO}$	$I_E=10\mu A, I_C=0$	6			V
Turn-ON Time	$t_{on}$	See specified Test Circuit.		30		ns
Storage Time	$t_{stg}$	See specified Test Circuit.		360		ns
Fall Time	$t_f$	See specified Test Circuit.		22		ns
[FET]						
Drain-to-Source Breakdown Voltage	$V_{(BR)DSS}$	$I_D=1mA, V_{GS}=0$	30			V
Zero-Gate Voltage Drain Current	$I_{DSS}$	$V_{DS}=30V, V_{GS}=0$			10	$\mu A$
Gate-to-Source Leakage Current	$I_{GSS}$	$V_{GS}=\pm 8V, V_{DS}=0$			$\pm 10$	$\mu A$
Cutoff Voltage	$V_{GS(off)}$	$V_{DS}=10V, I_D=100\mu A$	0.4		1.3	V
Forward Transfer Admittance	$ y_{fs} $	$V_{DS}=10V, I_D=80mA$	0.15	0.22		S
Static Drain-to-Source On-State Resistance	$R_{DS(on)1}$	$I_D=80mA, V_{GS}=4V$		2.9	3.7	$\Omega$
	$R_{DS(on)2}$	$I_D=40mA, V_{GS}=2.5V$		3.7	5.2	$\Omega$
	$R_{DS(on)3}$	$I_D=10mA, V_{GS}=1.5V$		6.4	12.8	$\Omega$
Input Capacitance	$C_{iss}$	$V_{DS}=10V, f=1MHz$		7.0		pF
Output Capacitance	$C_{oss}$	$V_{DS}=10V, f=1MHz$		5.9		pF
Reverse Transfer Capacitance	$C_{rss}$	$V_{DS}=10V, f=1MHz$		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	$Q_g$	$V_{DS}=10V, V_{GS}=10V, I_D=150mA$		1.58		nC
Gate-to-Source Charge	$Q_{gs}$	$V_{DS}=10V, V_{GS}=10V, I_D=150mA$		0.26		nC
Gate-to-Drain "Miller" Charge	$Q_{gd}$	$V_{DS}=10V, V_{GS}=10V, I_D=150mA$		0.31		nC
Diode Forward Voltage	$V_{SD}$	$I_S=150mA, V_{GS}=0$		0.87	1.2	V

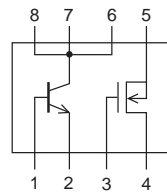
## Package Dimensions

unit : mm

2240



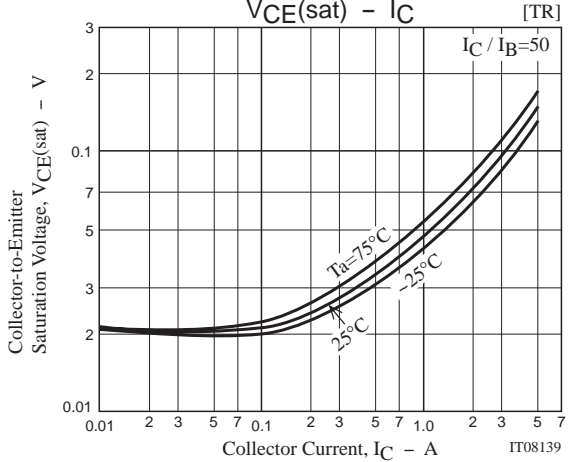
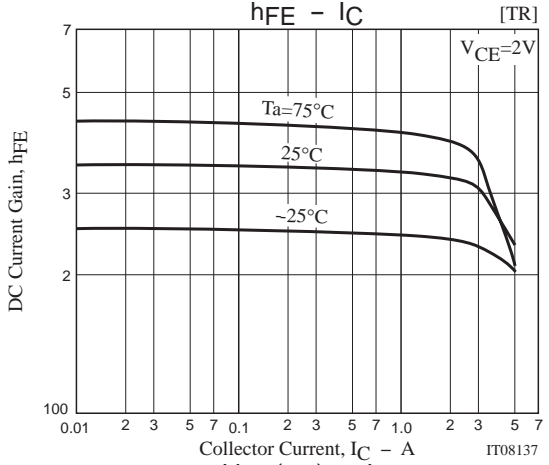
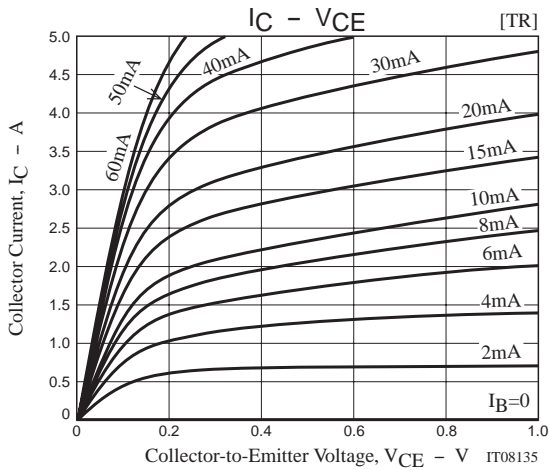
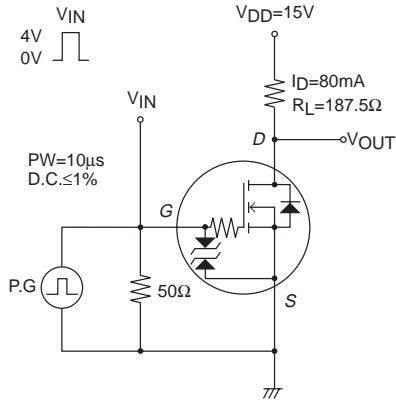
## Electrical Connection



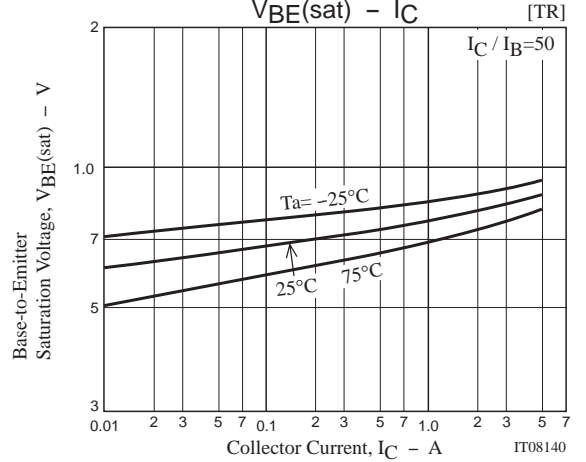
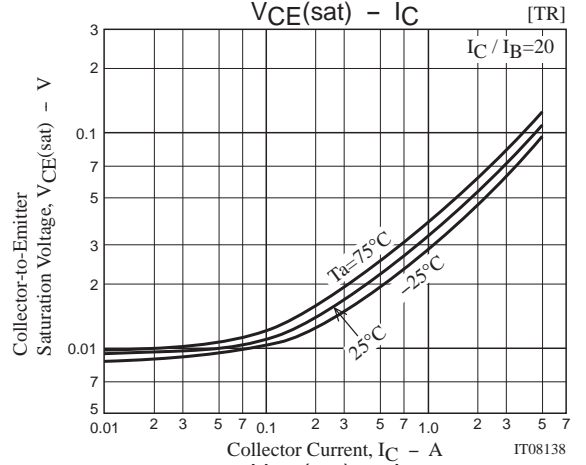
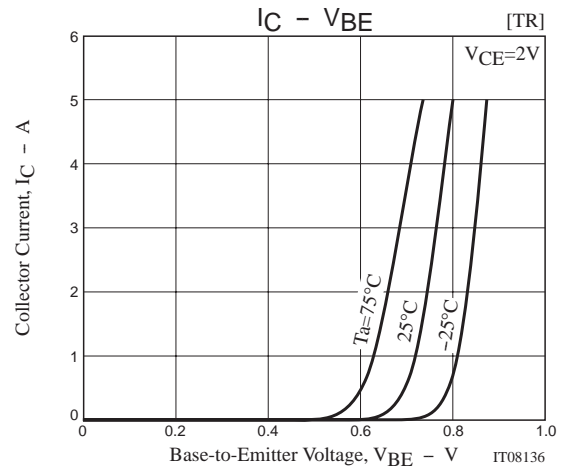
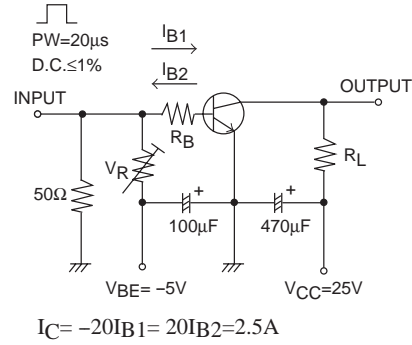
- 1 : Base
- 2 : Emitter
- 3 : Gate
- 4 : Drain
- 5 : Source
- 6 : Collector
- 7 : Collector
- 8 : Collector

Top view

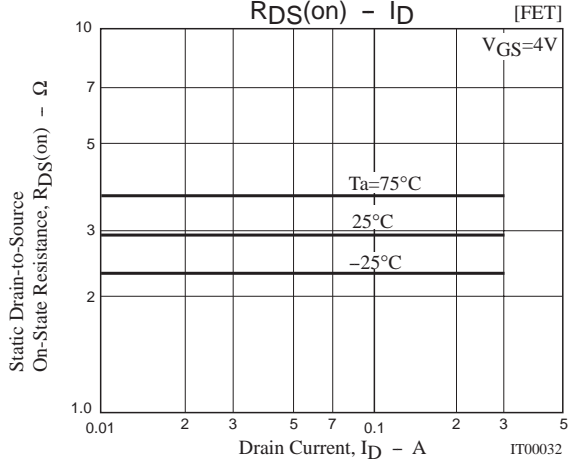
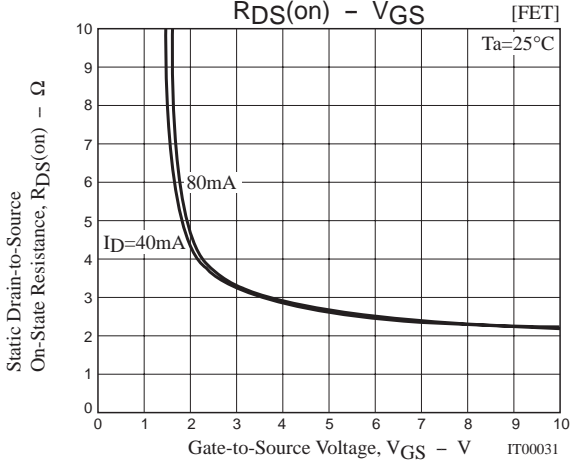
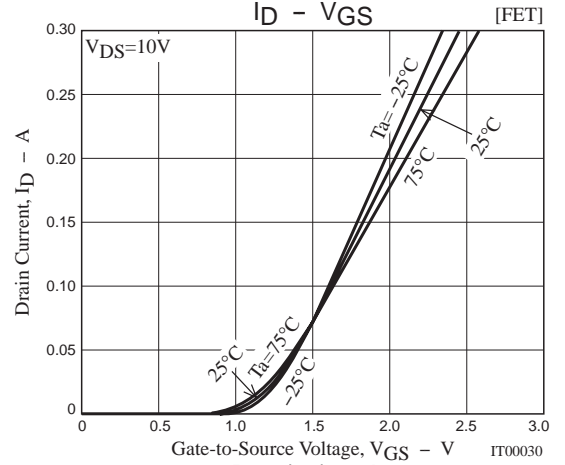
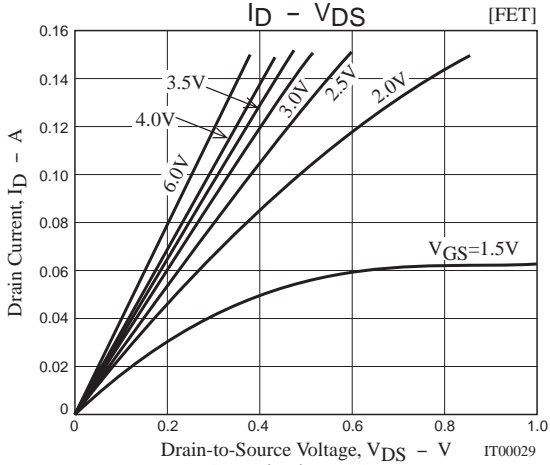
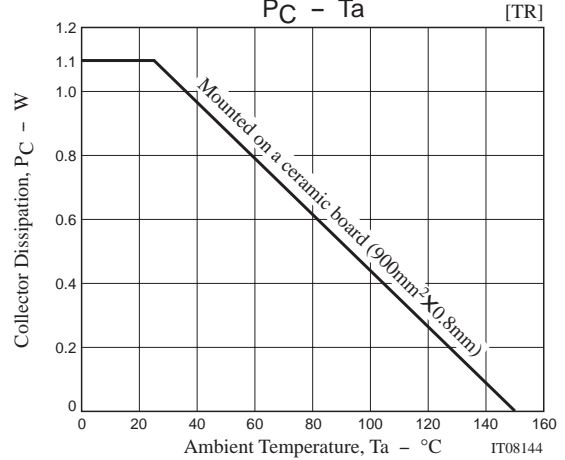
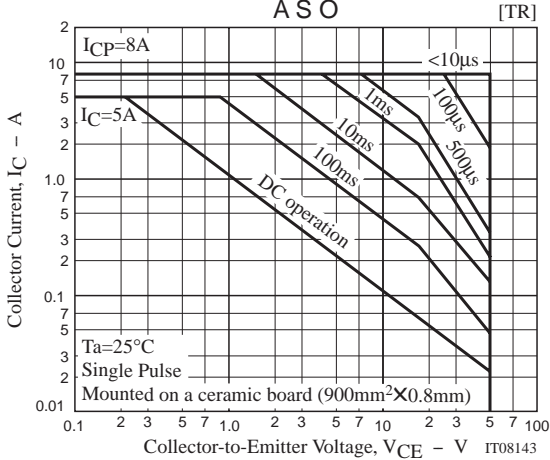
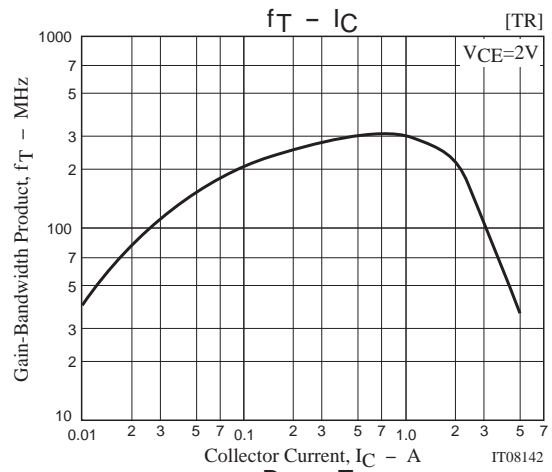
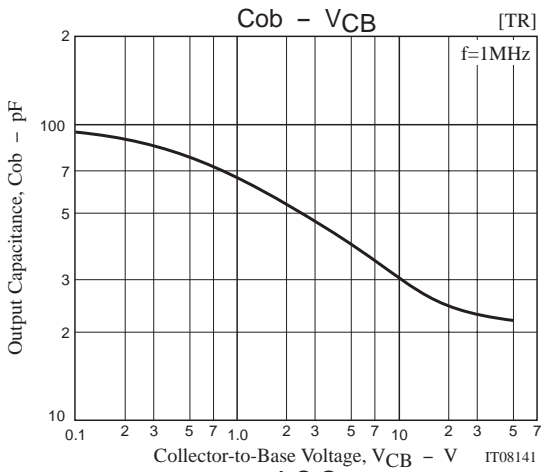
Switching Time Test Circuit



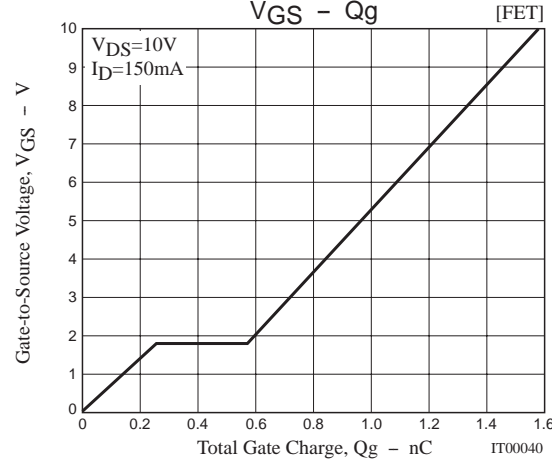
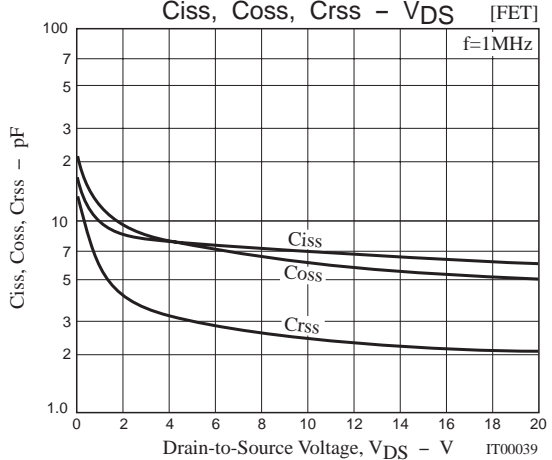
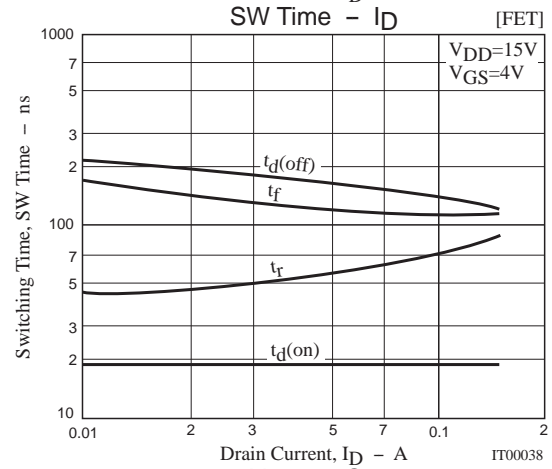
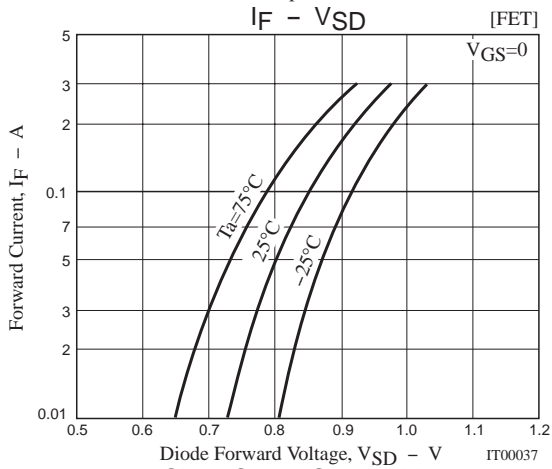
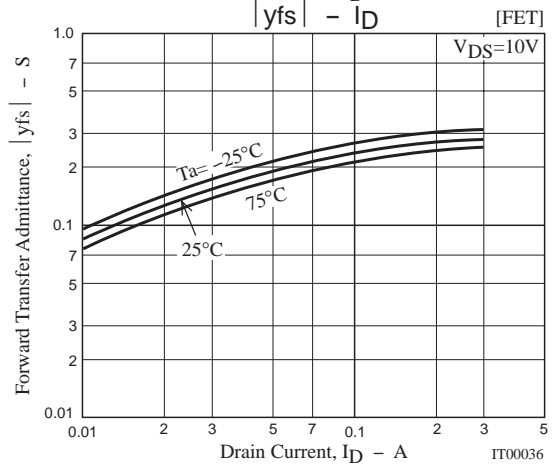
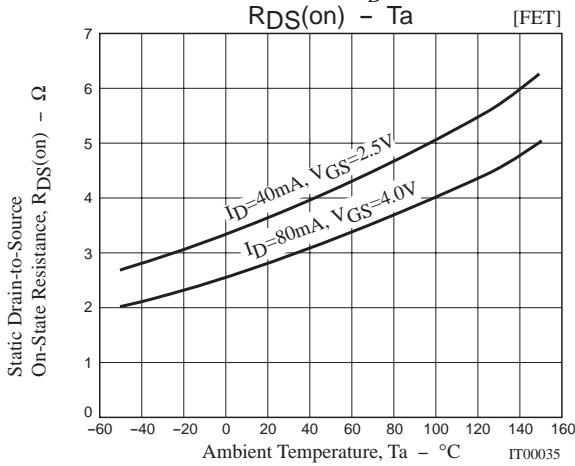
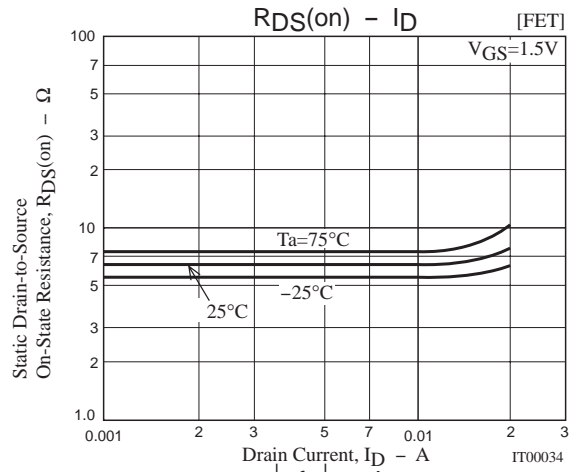
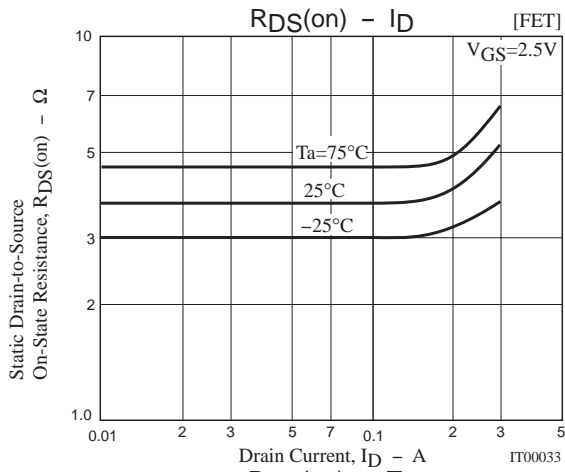
Switching Time Test Circuit



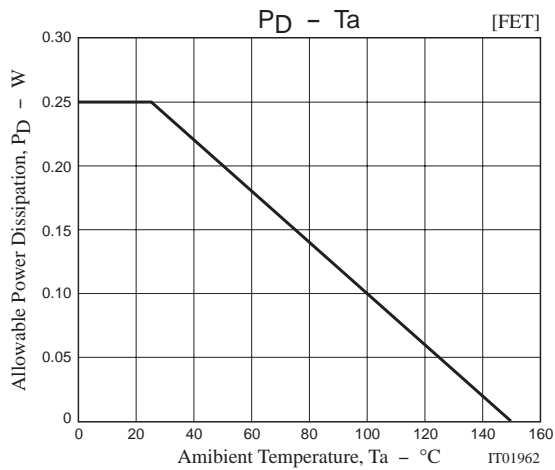
# VEC2901



# VEC2901



## VEC2901



Note on usage : Since the VEC2901 includes MOSFET, please avoid using this device in the vicinity of highly charged objects.

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