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SPECIFICATION

DEVICE NAME : High-Side Intelligent Power Switch (IPS)

TYPE NAME : F5021H

SPEC. No. : **MS5F4041**

Fuji Electric Co., Ltd.

This Specification is subject to change without notice.

	DATE	NAME	APPROVED	Fuji Electric Co., Ltd.	
DRAWN	June 16 '97	S. P. Rishi		DRAWING	MS5F4041
CHECKED	June 16 '97	S. P. Rishi	S. P. Rishi		
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1. Scope
This specifies Fuji High-Side Intelligent Power Switch F5021H
2. Construction Self-Isolation Structure. Output Part: N-channel enhancement mode
3. Application for switching
4. Outview TO-220F-15/5pin type. Outview : See to 6/17 page
5. Absolute maximum ratings at $T_c=25^{\circ}\text{C}$ (unless otherwise specified)

Description	Symbol	Characteristics	Unit	Remarks
Supply voltage	V_{cc}	50	V	
Supply voltage	V_{cc}	33	V	DC
Continuous Drain current	I_D	3	A	
Input voltage	V_{IH}	$-0.3 \sim V_{cc} + 0.3$	V	DC
Status current	I_{ST}	5	mA	
Maximum power dissipation	P_D	30	W	
Operating and storage temperature range	T_J T_{stg}	150 $-55 \sim +150$	$^{\circ}\text{C}$ $^{\circ}\text{C}$	

6. Electrical characteristics at $T_J=25^{\circ}\text{C}$ (unless otherwise specified)

Description	Symbol	Conditions	Characteristics			Unit
			Min.	Typ.	Max.	
Operating voltage	V_{cc}		6		28	V
Standby current	I_{cc}	$V_{cc}=13\text{V}$, $R_L=10\ \Omega$ $V_{IH}=0\text{V}$			3	mA
Input voltage	$V_{IH}(\text{H})$	$V_{cc}=13\text{V}$	3.5			V
	$V_{IH}(\text{L})$	$V_{cc}=13\text{V}$			1.5	V
Input current	$I_{IH}(\text{H})$	$V_{cc}=13\text{V}$, $V_{IH}=5\text{V}$			12	μA
On-state voltage	$V_{DS}(\text{on})$	$V_{cc}=13\text{V}$, $I_L=1.25\text{A}$			0.20	V
On-state resistance	$R_{DS}(\text{on})$	$V_{cc}=13\text{V}$, $I_L=1.25\text{A}$			0.16	Ω

Description	Symbol	Conditions	Characteristics			Unit
			Min.	Typ.	Max.	
Output leakage current	I_{OL}	$V_{CC} = 13V$			0.5	mA
Over-current detection *	I_{OC}	$V_{CC} = 13V$	3		6	A
Over-temperature shutdown	T_{CTIP}	$V_{CC} = 13V$	150		200	°C
Over-voltage shutdown	V_{OV}		28		33	V
Turn-on time	t_{on}	$V_{CC} = 13V$ $R_L = 10 \Omega$			80	μs
Turn-off time	t_{off}				40	μs
Input capacitance	C_{IN}	$V_{CC} = 13V$		10		pF
Status voltage	$V_{ST(L)}$	$V_{CC} = 13V, R_L = 10 \Omega$ $V_{IN} = 0V, I_{ST} = 1.0mA$			0.4	V
Status leakage current	$I_{ST(leak)}$	$V_{CC} = 13V, R_L = 10 \Omega$ $V_{IN} = 5V$			10	μA
Output-clamp voltage **	V_{CLAMP}	$V_{CC} = 13V, I_L = 1.0A$ $V_{IN} = 0V, L = 10mH$	-(50 - V_{CC})		-(60 - V_{CC})	V
Diode forward on-voltage	V_{SD}	$V_{IN} = 0V, I_{SD} = -6A$			1.5	V
Open-load detection	R_{LOPEN}	$V_{CC} = 13V, V_{IN} = 0V$	5		30	k Ω

* At Over-current detection, the device moved switcing mode.

Switcing mode specification see to 15/17 ~ 17/17 page.

** <Output-clamp voltage: V_{CLAMP} >

$$50V \leq V_{CC} + V_{CLAMP} \leq 60V$$

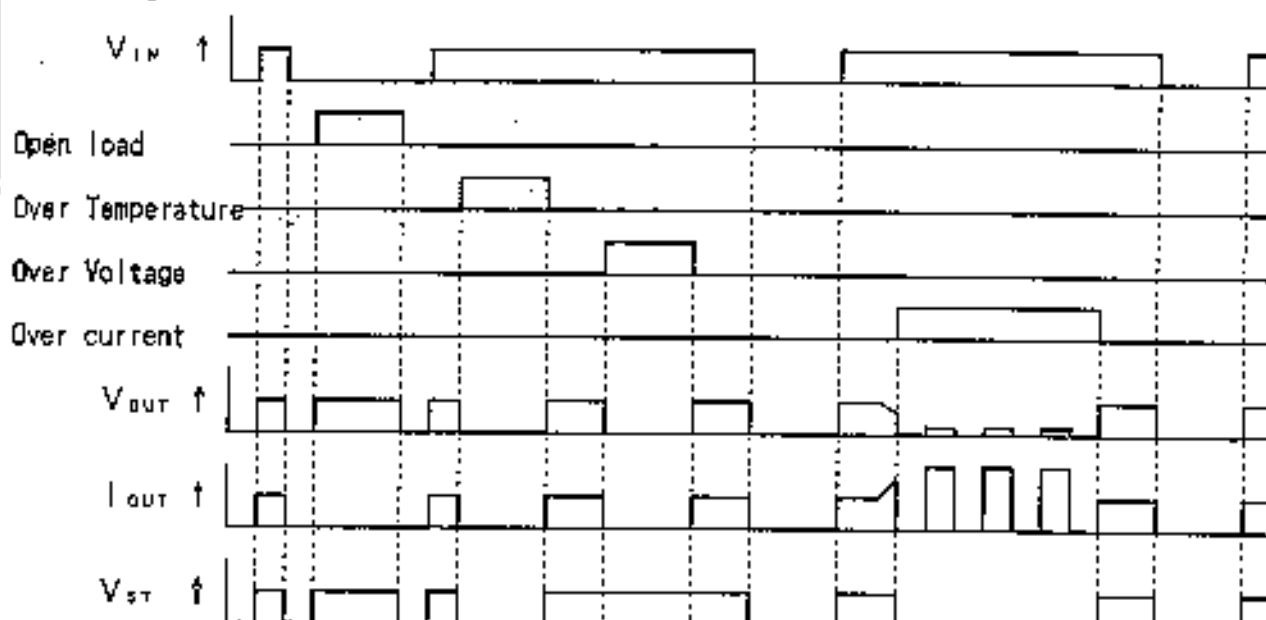

7. Thermal resistance

Description	Symbol	Conditions	Characteristics			Unit
			Min.	Typ.	Max.	
Thermal resistance	R_{thJA}				4.17	°C/W
	R_{thJS}				62.5	°C/W

8. Truth Table

	Input voltage	Status voltage	Output voltage	Remarks
Normal operation	L H Open	L H L	L H L	
Open load	L	H	H	Auto-restart
Over current	L H	L L	L L	switting mode Auto-restart
Over Temperature	L H	L L	L L	Auto-restart
Over Voltage	L H	L H	L L	Auto-restart

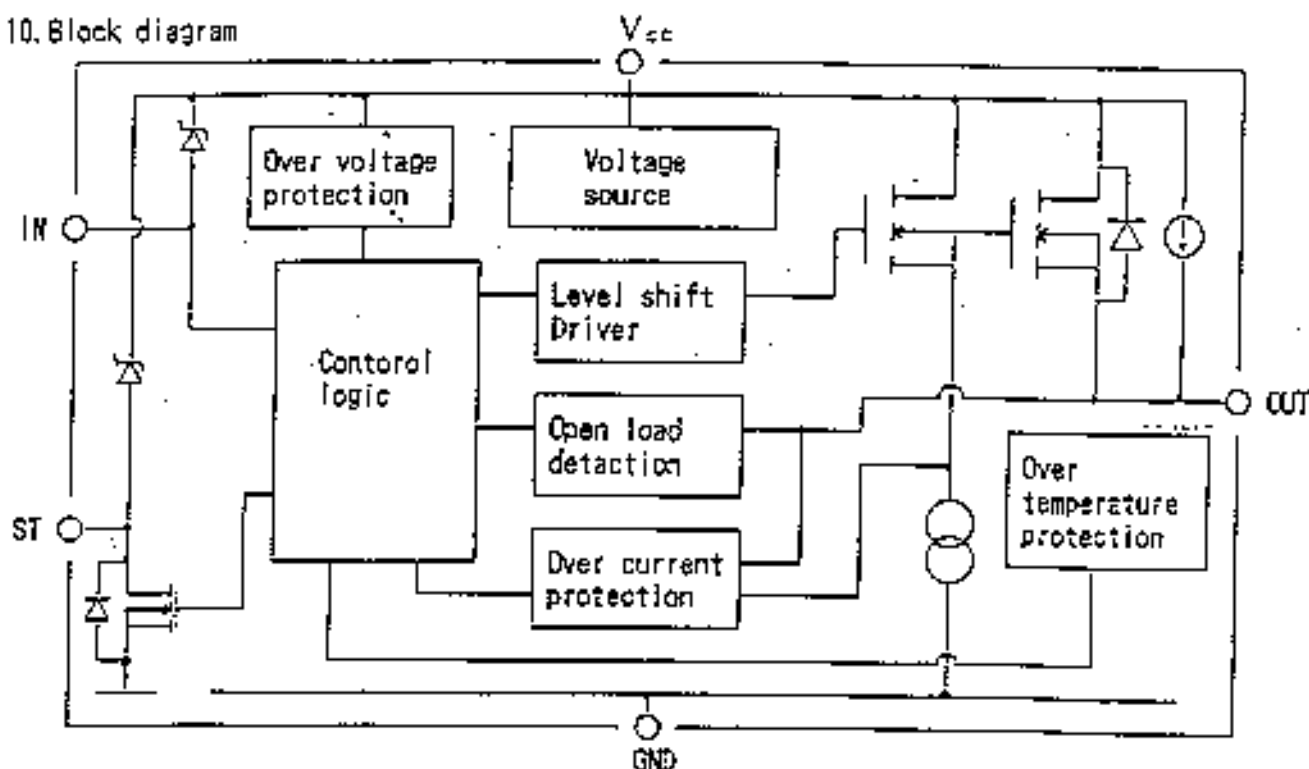
9. Timing Chart



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10. Block diagram

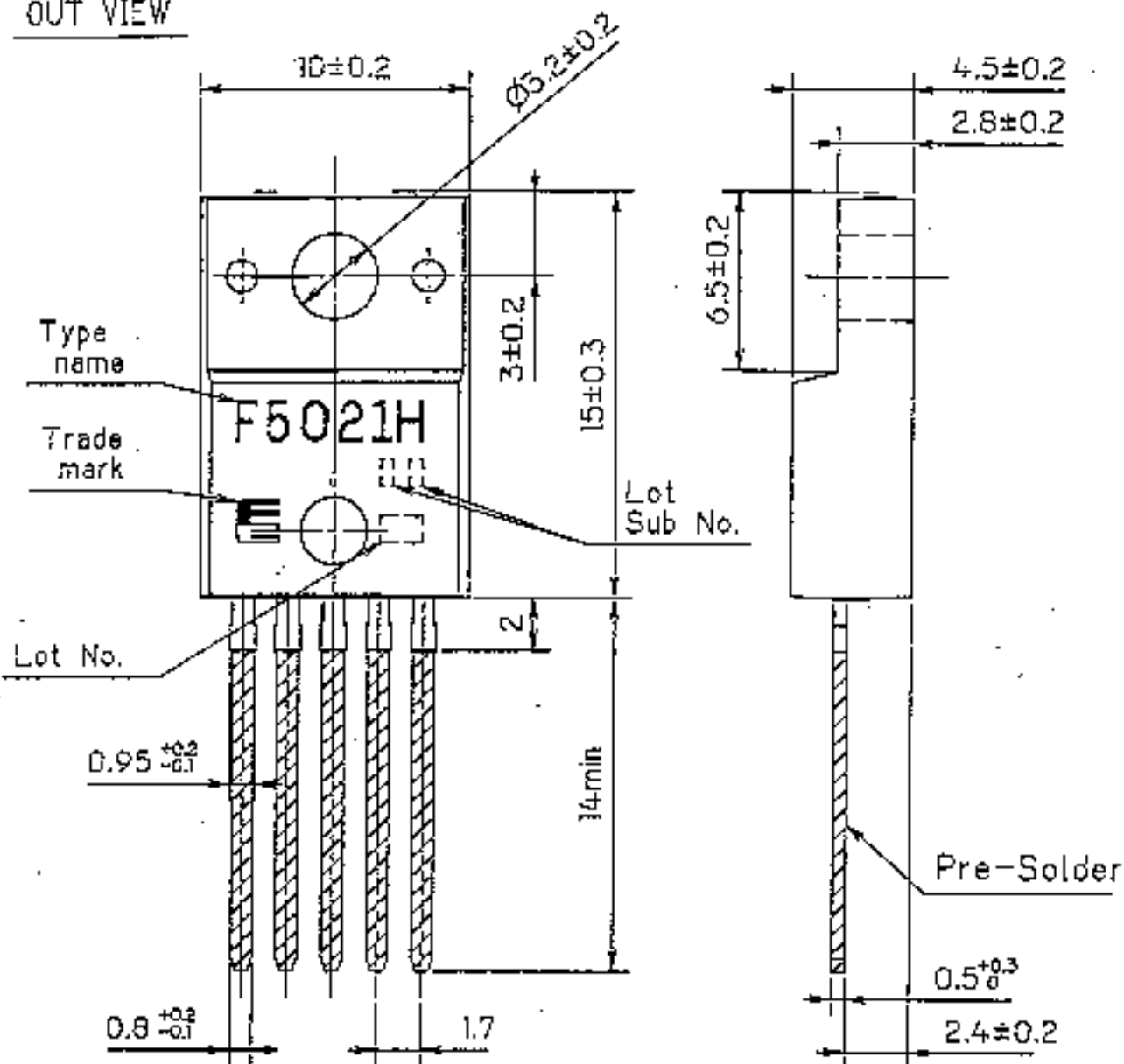


11. Characteristics curves See to 7/17 ~17/17 page

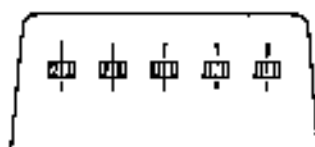
HIGH SIDE IPS

TYPE : F5021H

OUT VIEW



① ② ③ ④ ⑤



DIMENSIONS ARE IN MILLIMETERS.

Terminal No.	Function	Symbol
①	INPUT	IN
②	STATUS	ST
③	GROUND	GND
④	OUT PUT	OUT
⑤	SUPPLY VOLTAGE	Vcc

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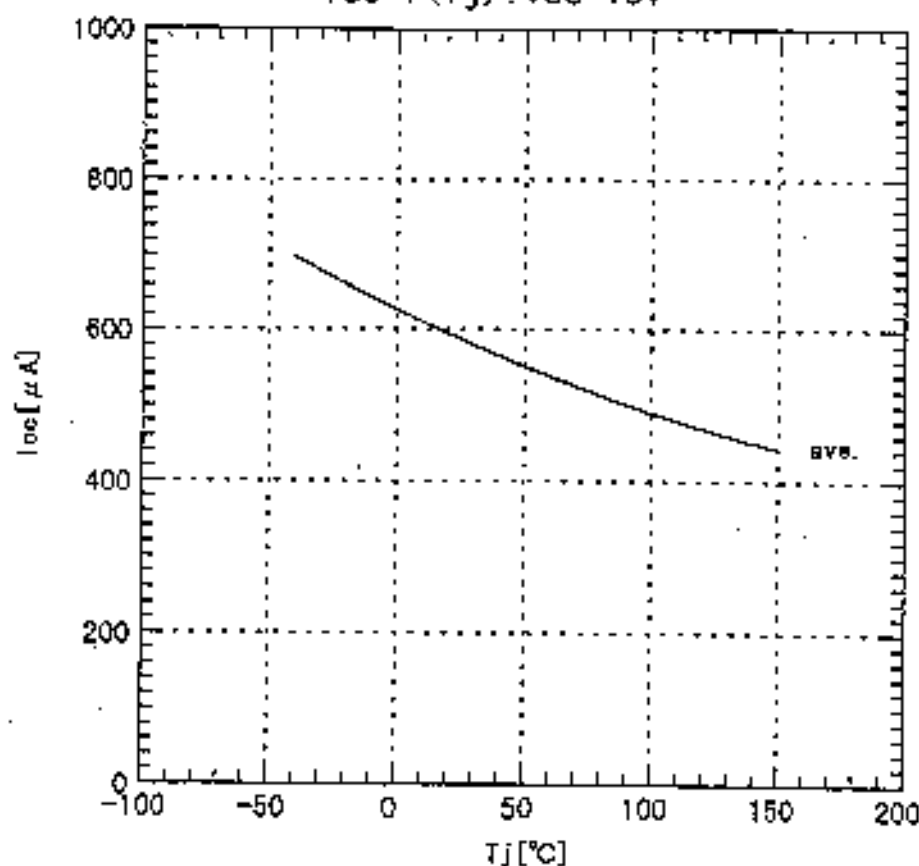
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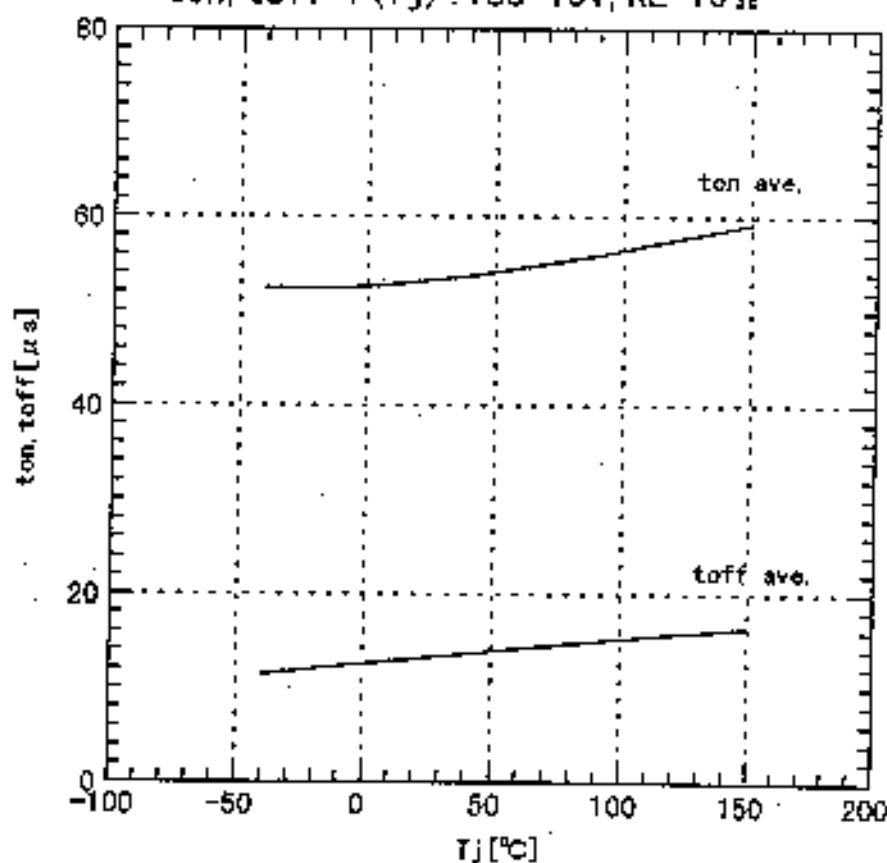
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Standby current
 $I_{cc}=f(T_j) : V_{cc}=13V$



Turn-on, Turn-off time
 $t_{on}, t_{off}=f(T_j) : V_{cc}=13V, R_L=10\Omega$



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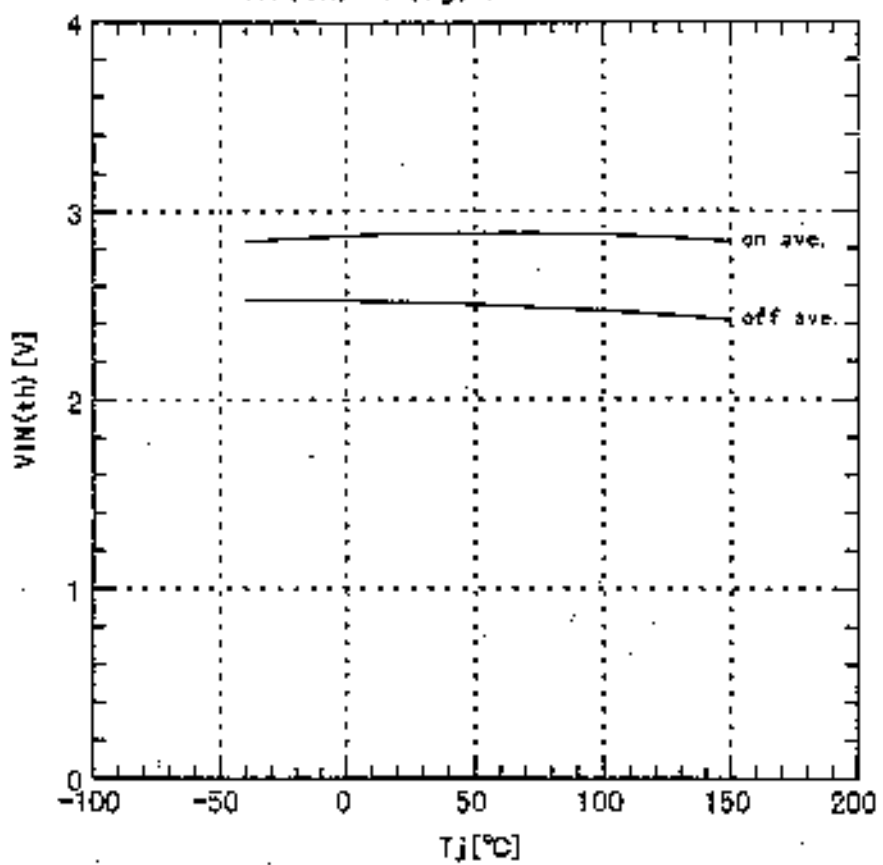
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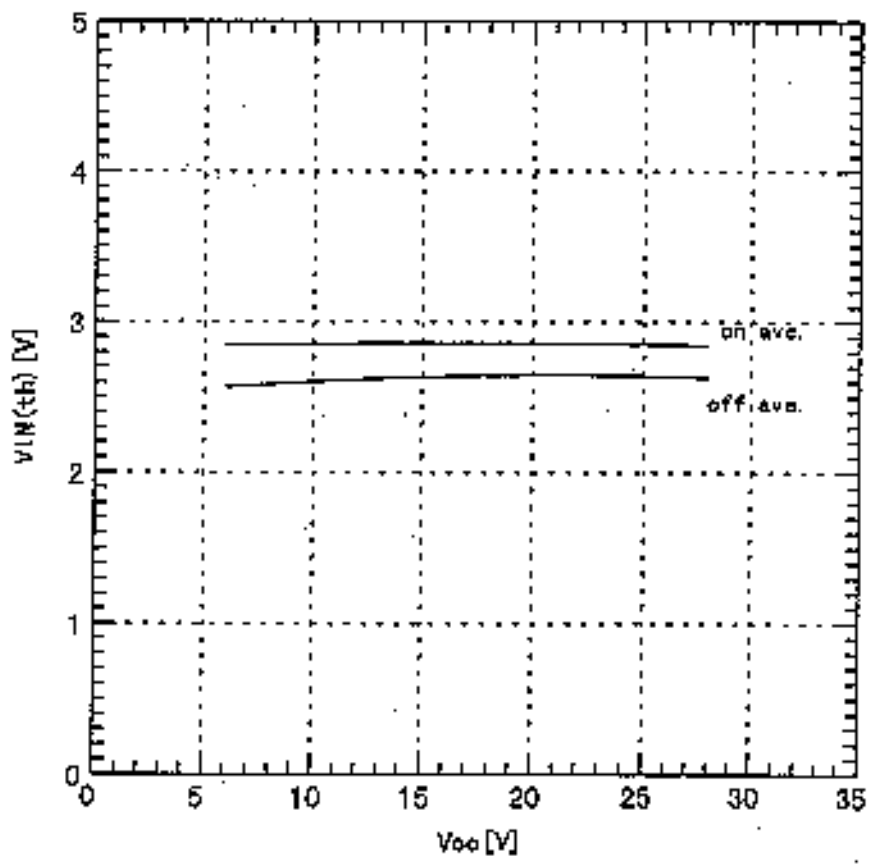
Input thershold voltage

$$VIN(th)=f(Tj):V_{cc}=13V$$



Input thershold voltage

$$VIN(th)=f(V_{cc})$$



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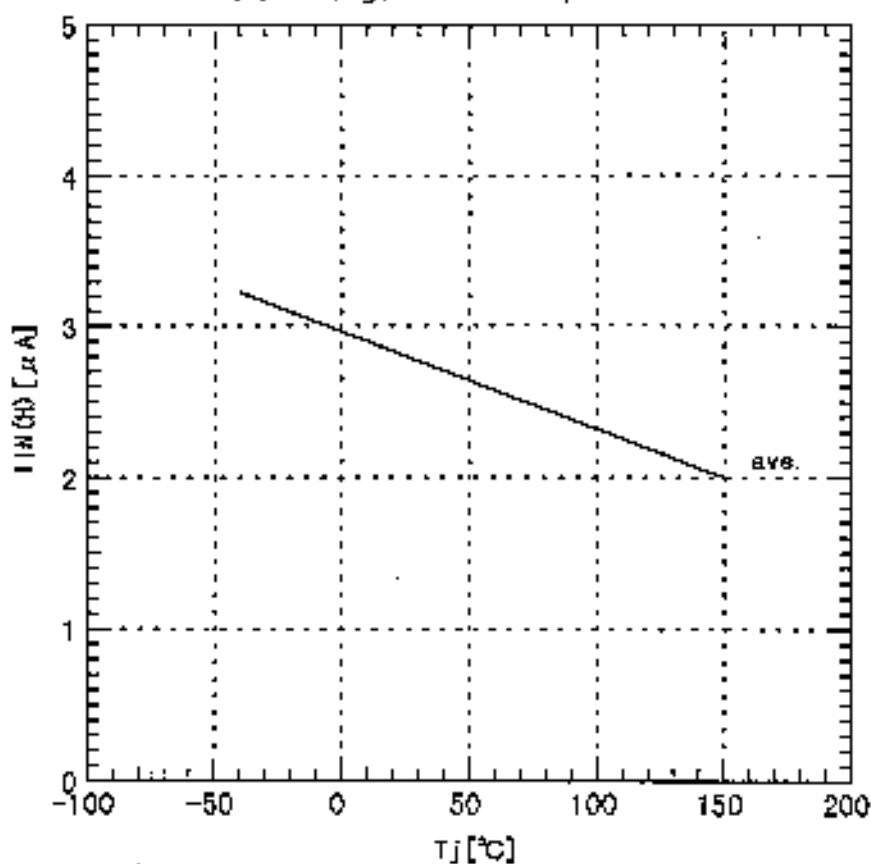
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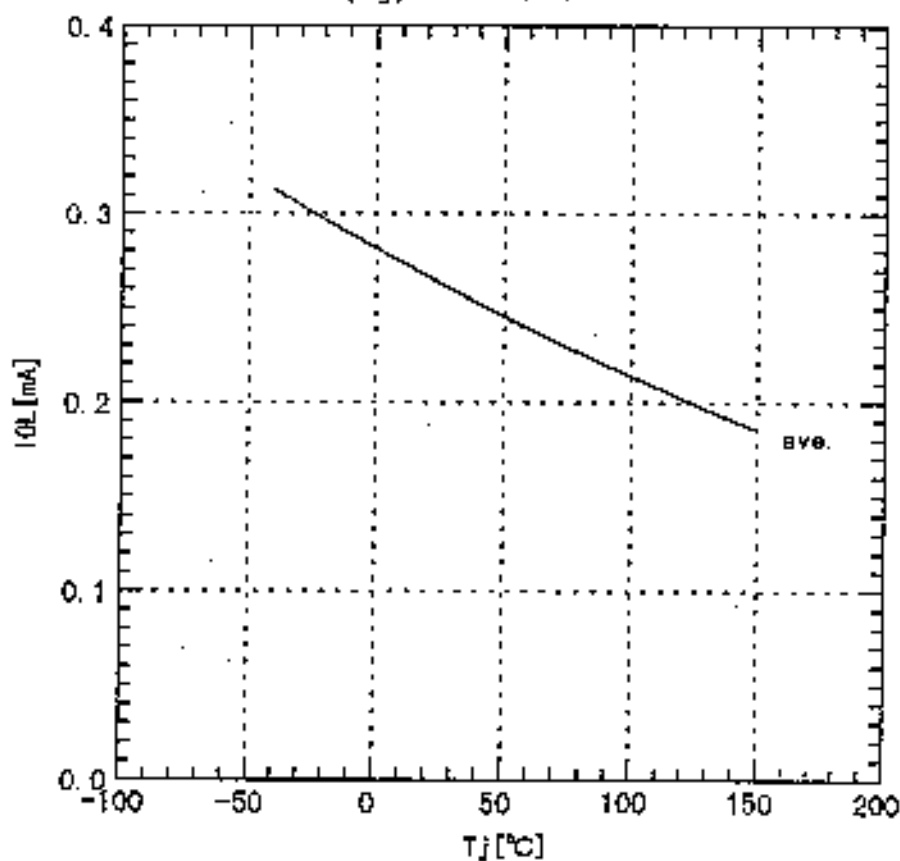
Input current

$$I_{IN}(H) = f(T_J) : V_{CC} = 13V, V_{IN} = 5V$$



Output leakage current

$$I_{OL} = f(T_J) : V_{CC} = 13V$$



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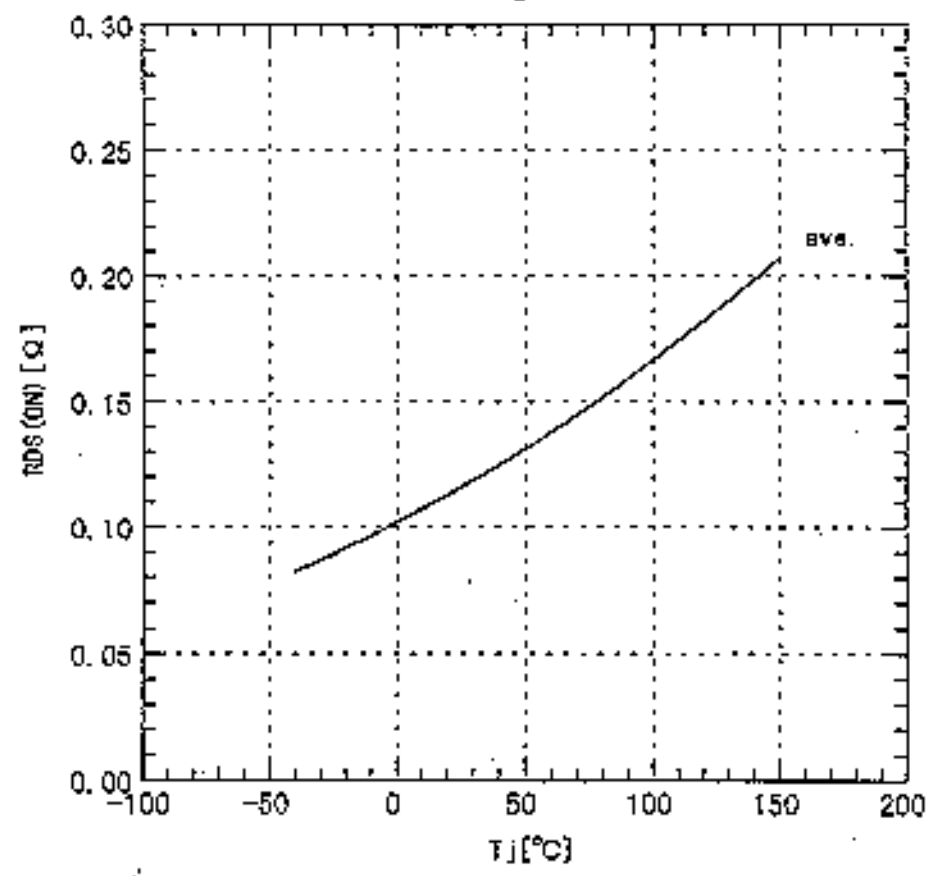
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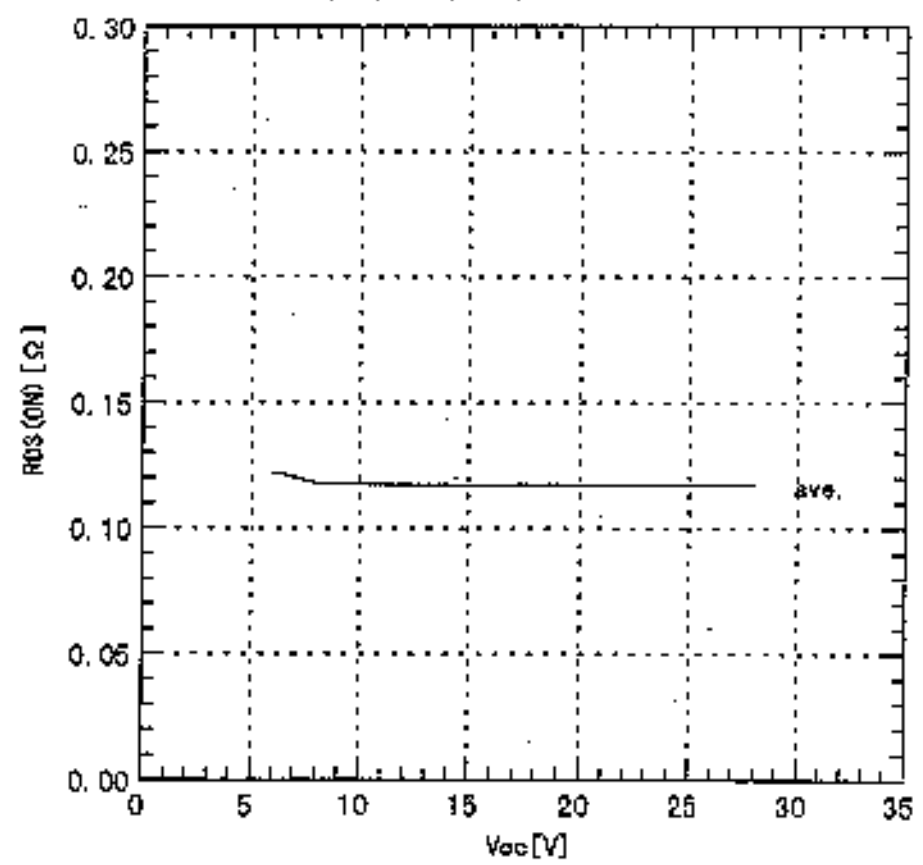
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On-state resistance
 $R_{DS(ON)} = f(T_J) : V_{CC} = 13V$



On-state resistance
 $R_{DS(ON)} = f(V_{CC}) : I_L = 1.25A$



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ORIGINAL

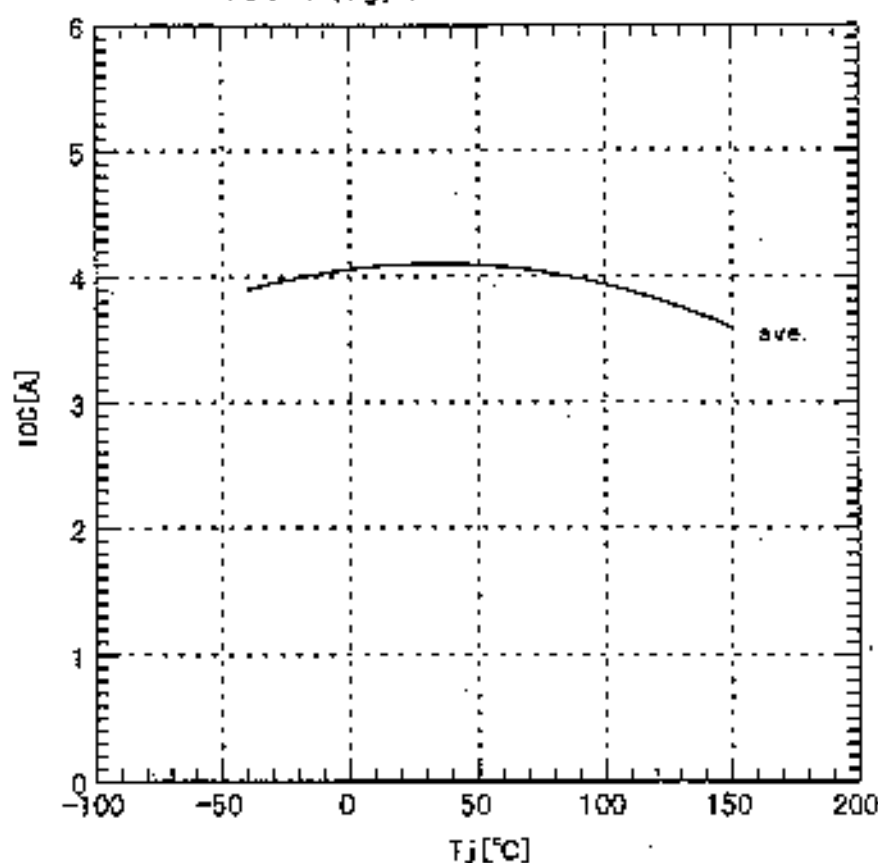
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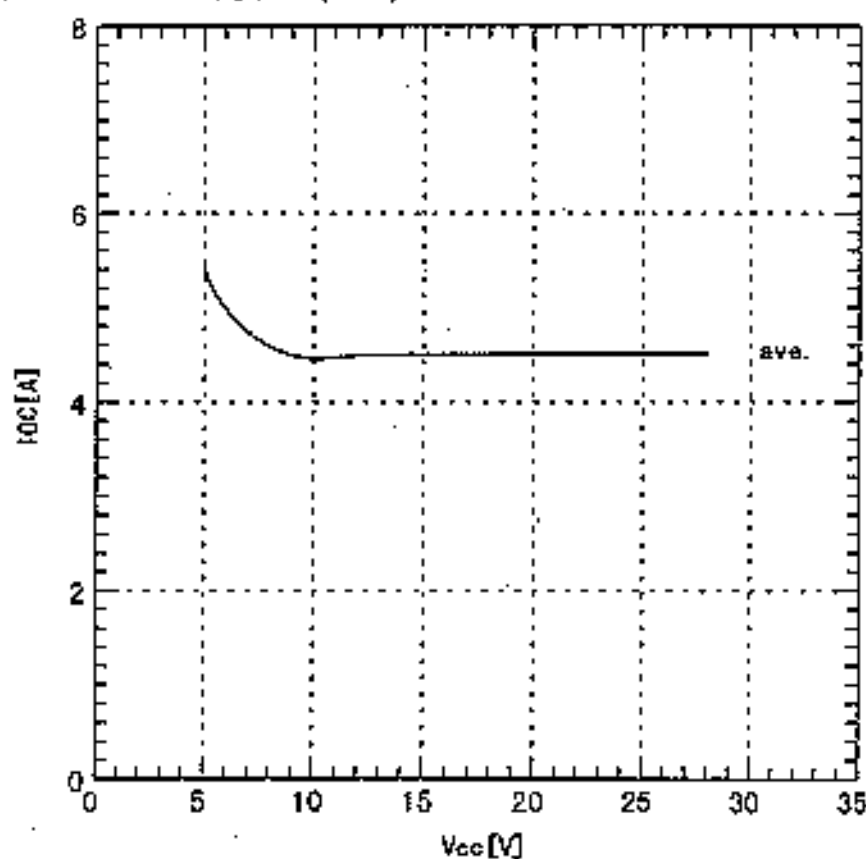
Over-current detection

$$I_{OC}=f(T_j) : V_{CC}=13V$$



Over-current detection

$$I_{OC}=f(V_{CC})$$



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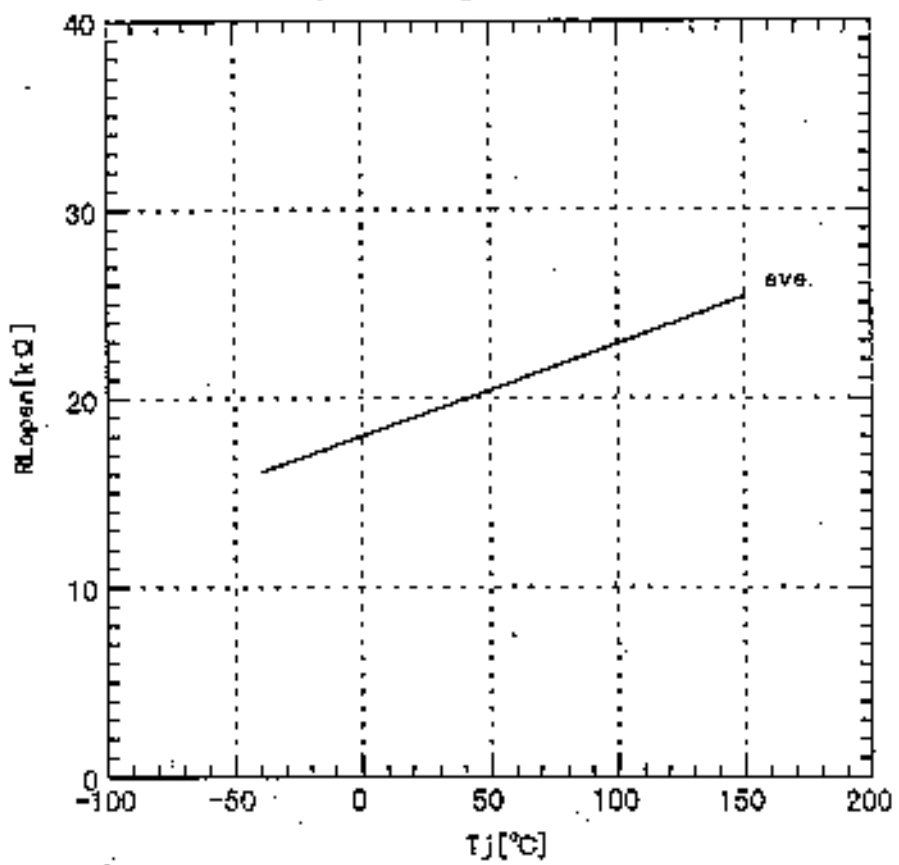
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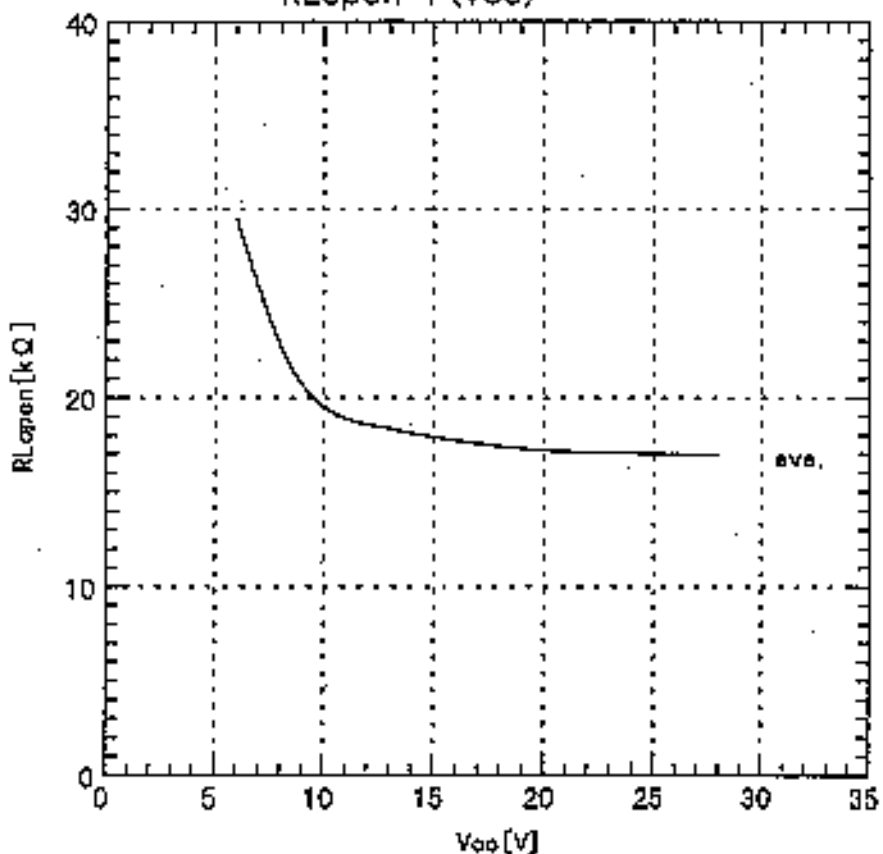
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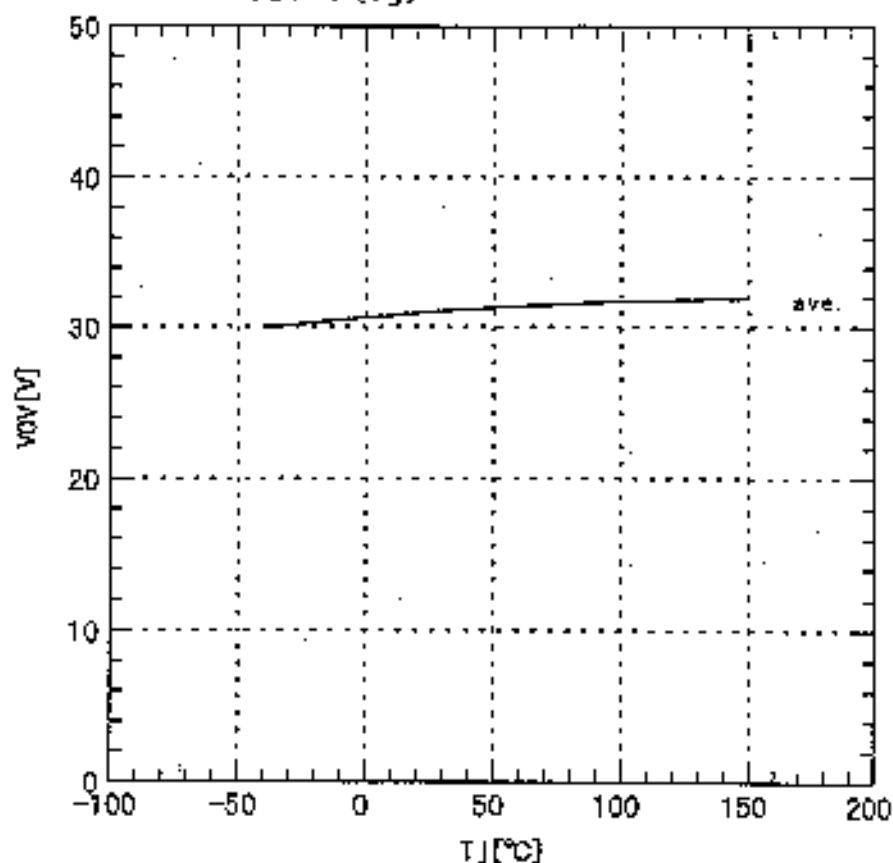
Open-load detection
 $R_{Lopen} = f(T_j) : V_{CC} = 13V$



Open-load detection
 $R_{Lopen} = f(V_{CC})$

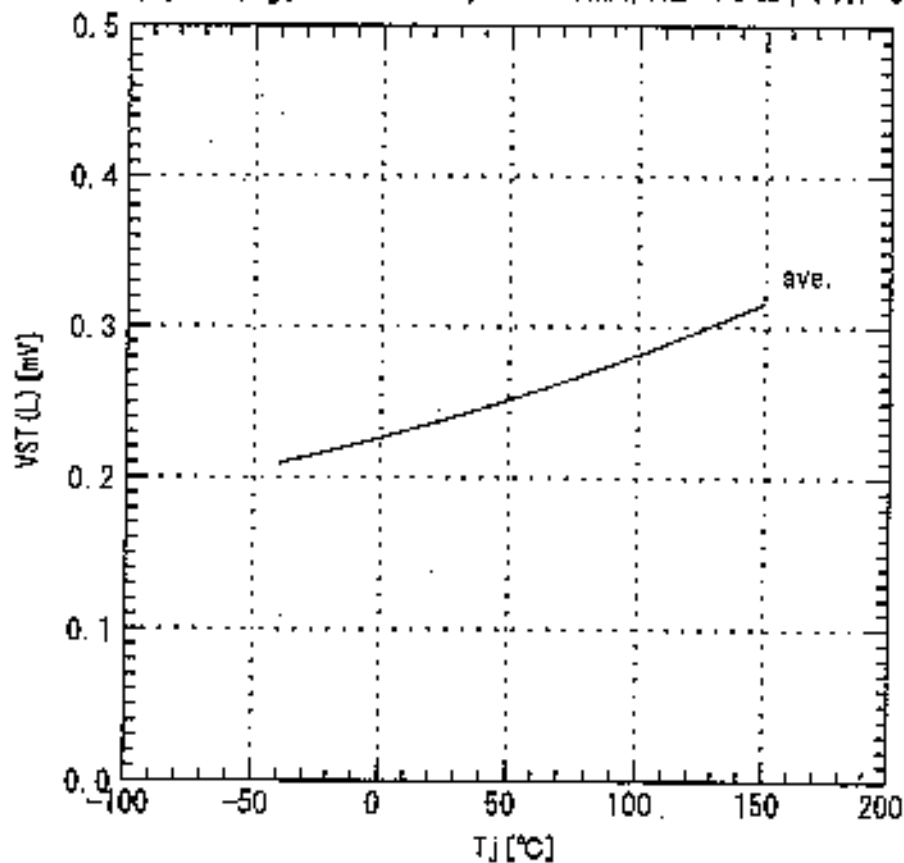


Over-voltage shutdown $V_{OV}=f(T_J)$



Status Voltage

$V_{st}(L)=f(T_J)$: $V_{CC}=13V$, $I_{st}=1mA$, $R_L=10\Omega$, $V_{IN}=0V$



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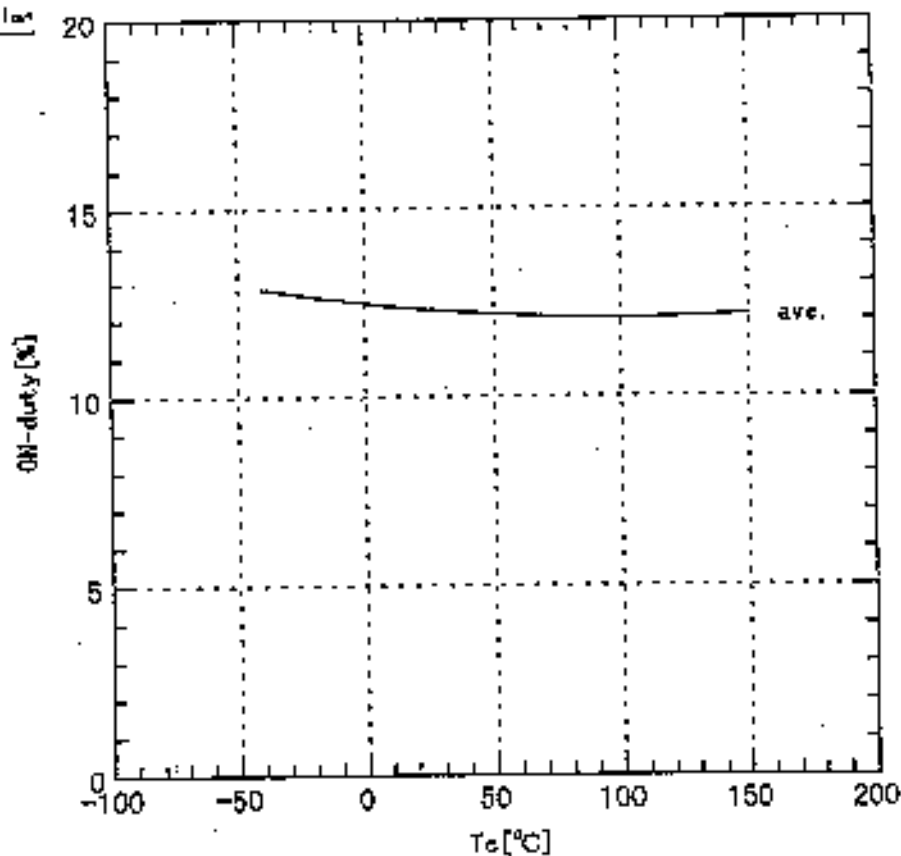
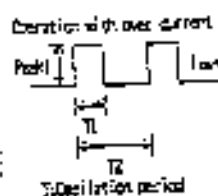
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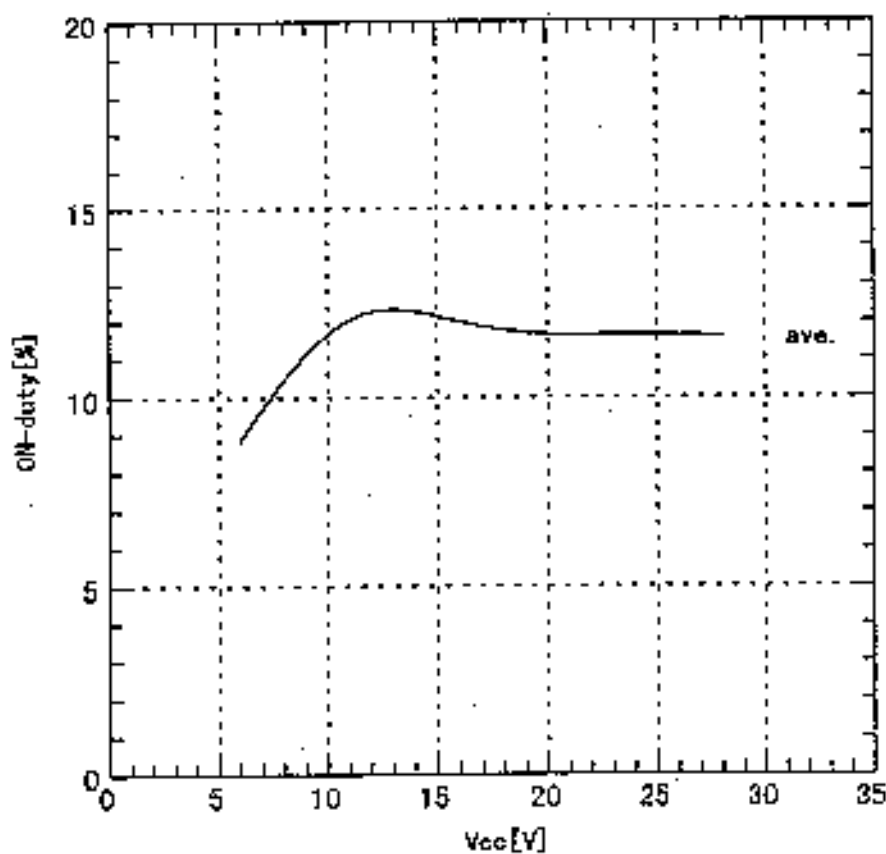
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ON-duty ($T1/T2$) = $f(T_c)$: $V_{cc}=13V$, $V_{IN}=5V$



ON-duty ($T1/T2$) = $f(V_{cc})$: $T_c=25^\circ C$, $V_{IN}=5V$



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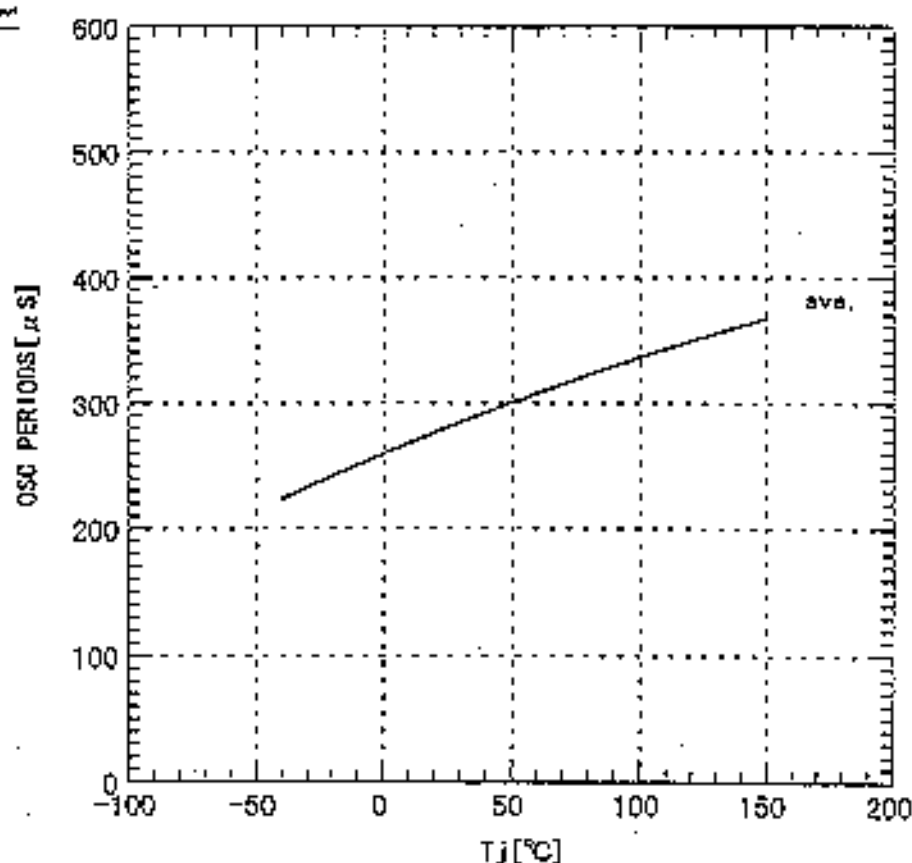
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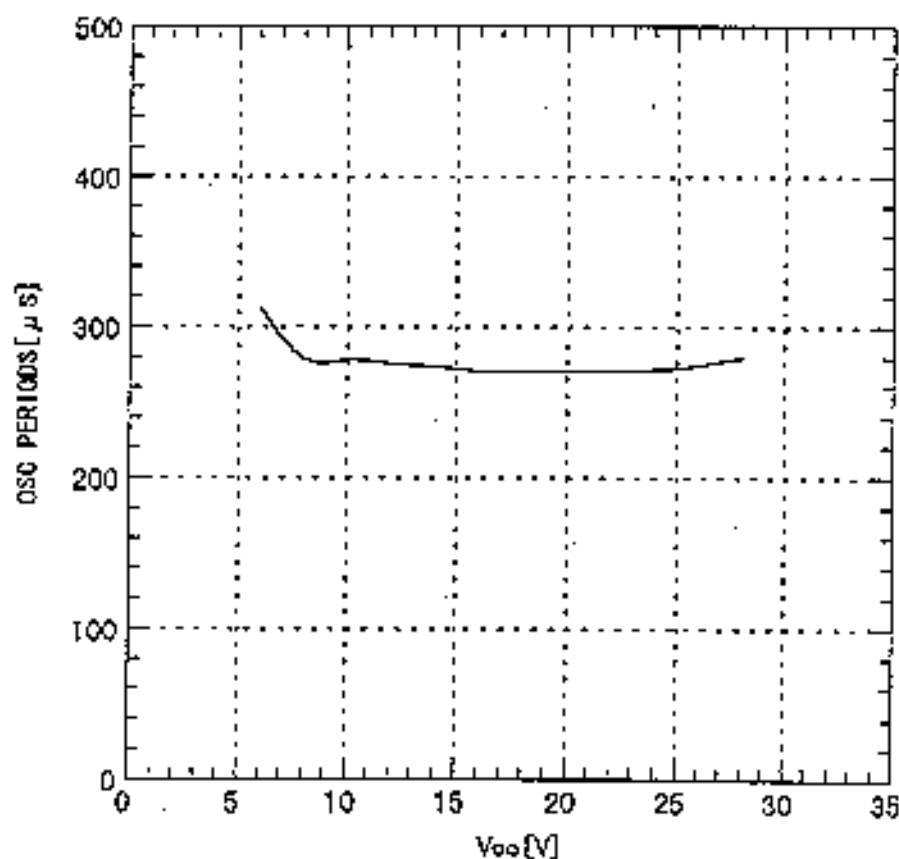
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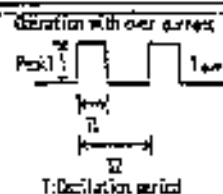


OSC PERIODS=f(T_j): V_{cc}=13V, V_{IN}=5V



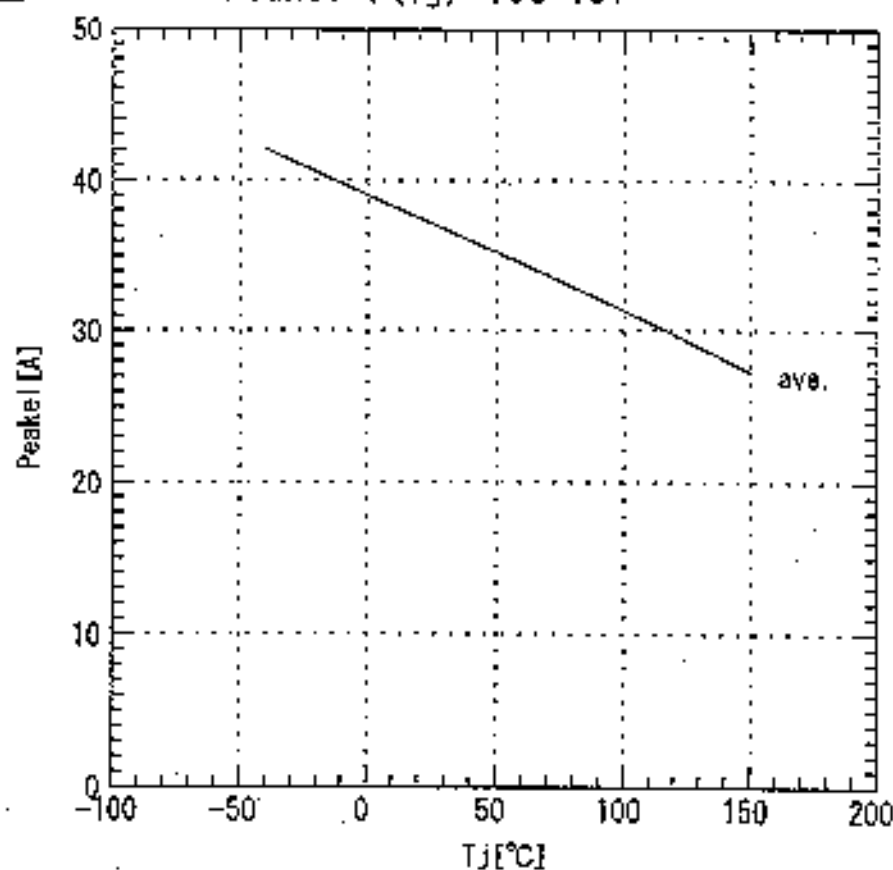
OSC PERIODS=F(V_{cc}): V_{IN}=5V





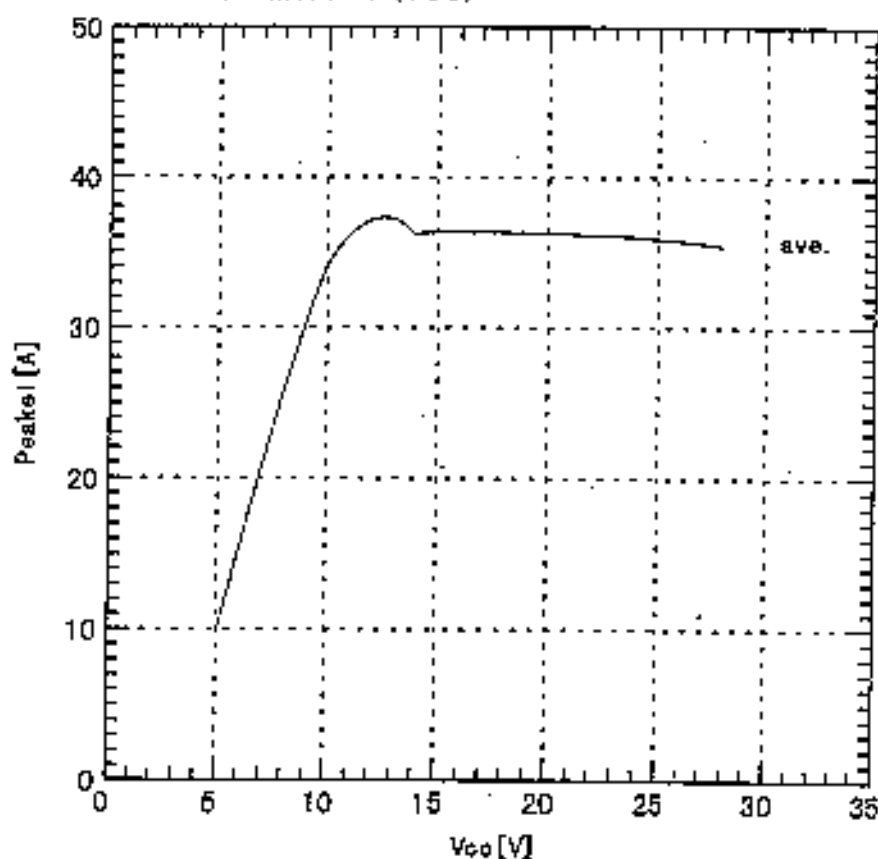
Peake-current detection

$$PeakI = f(T_J) : V_{CC} = 13V$$



Peake-current detection

$$PeakI = f(V_{CC})$$



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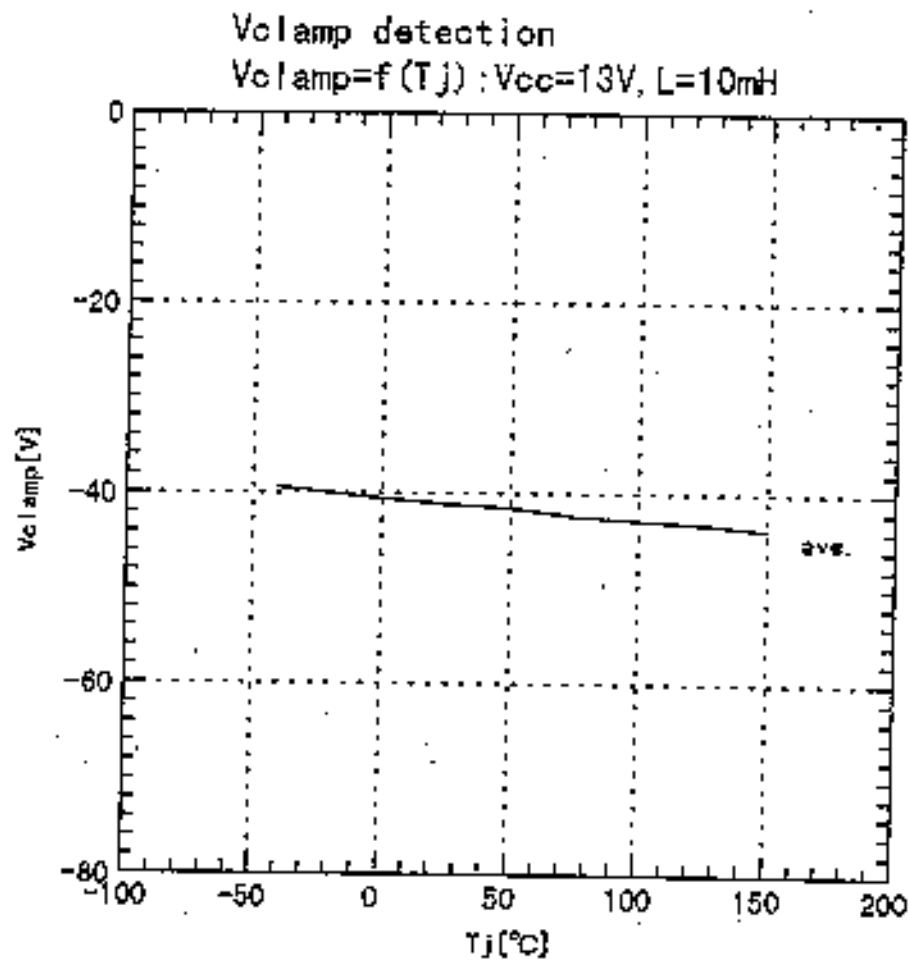
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