SUMITOMO ELECTRIC

F0530602B

3.3V Operation
Laser Diode Driver

♦ *Features*

- Up to 1.3 Gb/s high speed operation
- 3.3 V single power supply
- Up to 35 mA p-p modulation current
- Up to 35 mA bias current
- Maximum bias current preset control

♦ *Applications*

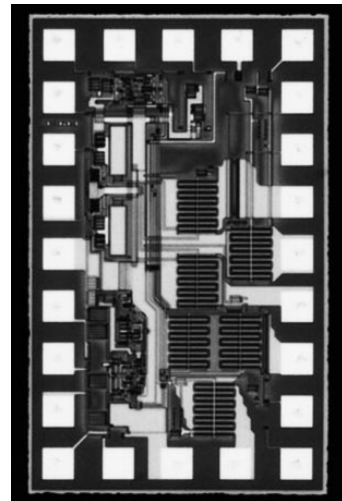- Laser diode driver of an optical transmitter circuit for SDH (STM4) / SONET (OC-12)

♦ *Functional Description*

The F0530601B is a high performance GaAs integrated laser diode driver for use in an optical transmitter circuit up to 1.3 Gb/s NRZ data rate. The F0530601B typically specifies rise time and fall time of 300 psec (20 % - 80 %,25 Ω load). It features a low power 3.3 V supply operation, 1 to 35 mA presettable bias current and up to 35 mA modulation current.

♦ *Absolute Maximum Ratings*

T_a=25 °C, unless specified

Parameter	Symbol	Value	Units
Supply Voltage	V_{DD} , V_{SS}	- 0.2 to 4.0	V
Supply Current	Ickt	150	mA
Modulation Current	Iout	70	mA
Bias Current	Ioutbi	70	mA
Input Voltage	Vin	V_{SS} to $V_{DD+0.5}$	V
Junction Operating Temperature	Tj	0 to +140	°C
Storage Temperature	T_{stg}	-55 to +150	°C

♦ *Recommended Operating Conditions*

T_a=25 °C , V_{DD}=0 V, V_{SS}=-3.3 V, unless specified

Parameter	Symbol	Value			Units
		Min.	Typ.	Max.	
Supply Voltage	V_{DD}- V_{SS}	3.135	3.3	3.465	V
Output Voltage	Vout	V_{DD} -1.6	V_{DD} -1.0	V_{DD}	V
Input Voltage Vreg	Vreg	V_{SS} +1.86	OPEN	V_{SS} +2.12	V
Junction Operating Temperature	Tj	0	25	125	°C

♦ *Electrical Characteristics*

T_a=25 °C, V_{DD}-V_{SS}=3.135 ~ 3.465V, unless specified

Parameter	Symbol	Test Conditions	Value			Units
			Min.	Typ.	Max.	
Supply Current	Ickt	IMOD, IBIAS are excluded	-	35	50	mA
Input Voltage (for TD,TDB)	VIH	Differential Input	V_{DD}-1.17	V_{DD}-0.8	V_{DD}-0.73	V
	VIL		V_{DD}-1.95	V_{DD}-1.8	V_{DD}-1.45	V
Input Current	IIH	VIH=V_{DD}-0.7V	-100	-	100	μA
	IIL	VIL=V_{DD}-1.9V	-100	-	100	μA
Input Resistance	Ri	DC, V_{DD}=V_{SS}=GND	1	1.3	-	kΩ
Input Bias Voltage	VIB	V_{DD}-V_{SS}=3.3V	V_{DD}-1.17	V_{DD}-1.3	V_{DD}-1.43	V
Modulation Current	IMMAX	VDIS=OPEN	35	-	-	mA
	IMMIN	VDIS=OPEN	-	-	5	mA
	IMDIS	VDIS=V_{DD}-0.2V	-	-	0.5	mA
Bias Current	IBMAX	VDIS=OPEN	35	-	-	mA
	IBMIN	VDIS=OPEN	-	-	5	mA
	IBDIS	VDIS=V_{DD}-0.2V	-	-	0.5	mA
Input Voltage for Disable	VDISIH	Disable Operation	V_{DD}-2	-	V_{DD}	V
	VDISIL	Enable Operation	V_{SS}	OPEN	V_{SS}+0.2	V
Resistance for Bias Monitor	RBM		-	10	-	Ω
Monitor Voltage of Mark Ratio	VMRK	Differential Output	-	0.9	-	V
Rise time	tr	RL=25Ω, 20%-80%	-	300	-	ps
Fall time	tf	RL=25Ω, 20%-80%	-	300	-	ps

♦ Block Diagram
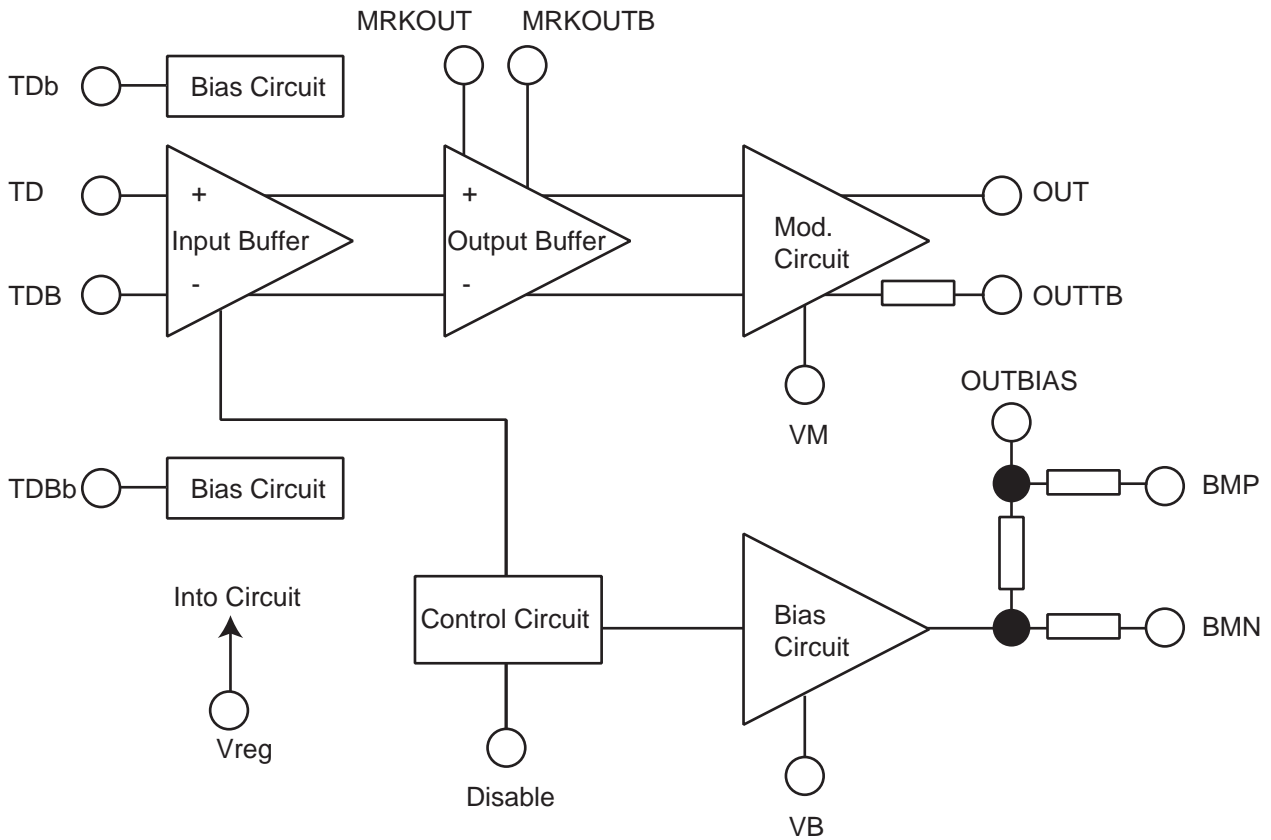
♦ Die Pad Description

TD	Data Input (pos.)
TDB	Data Input (neg.)
TDb	Input Bias (pos.)
TDBb	Input Bias (neg.)
OUT	Modulation Current Output (pos.)
OUTB	Modulation Current Output (neg.)
OUTBIAS	Bias current Output
VM	Modulation Current Control
VB	Bias Current control
Disable	Current Shutdown Control
Vreg	Reference Voltage
BMP	Bias Current Monitor (pos.)
BMN	Bias Current Monitor (neg.)
MRKOUT	Mark ratio Monitor (pos.)
MRKOUTB	Mark ratio Monitor (neg.)

♦ *Die Pad Assignments*
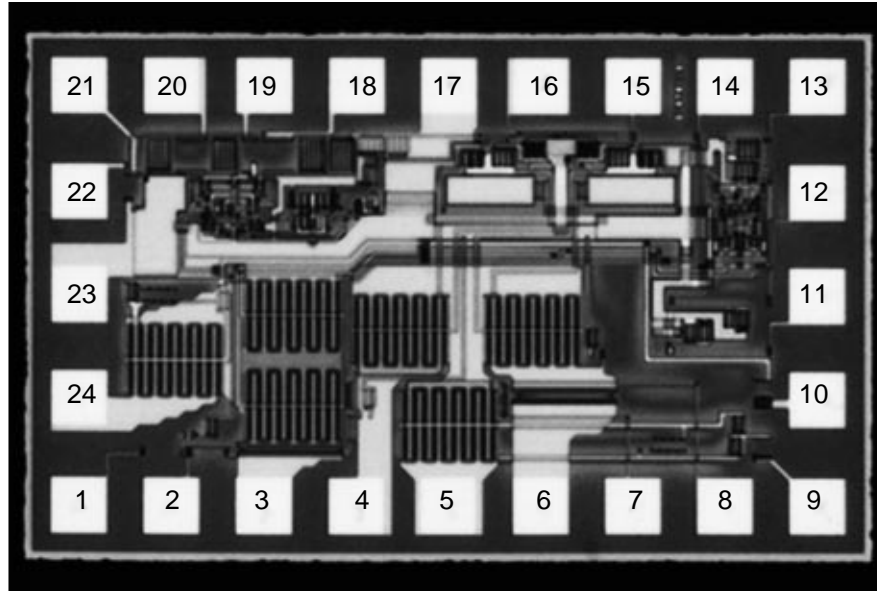
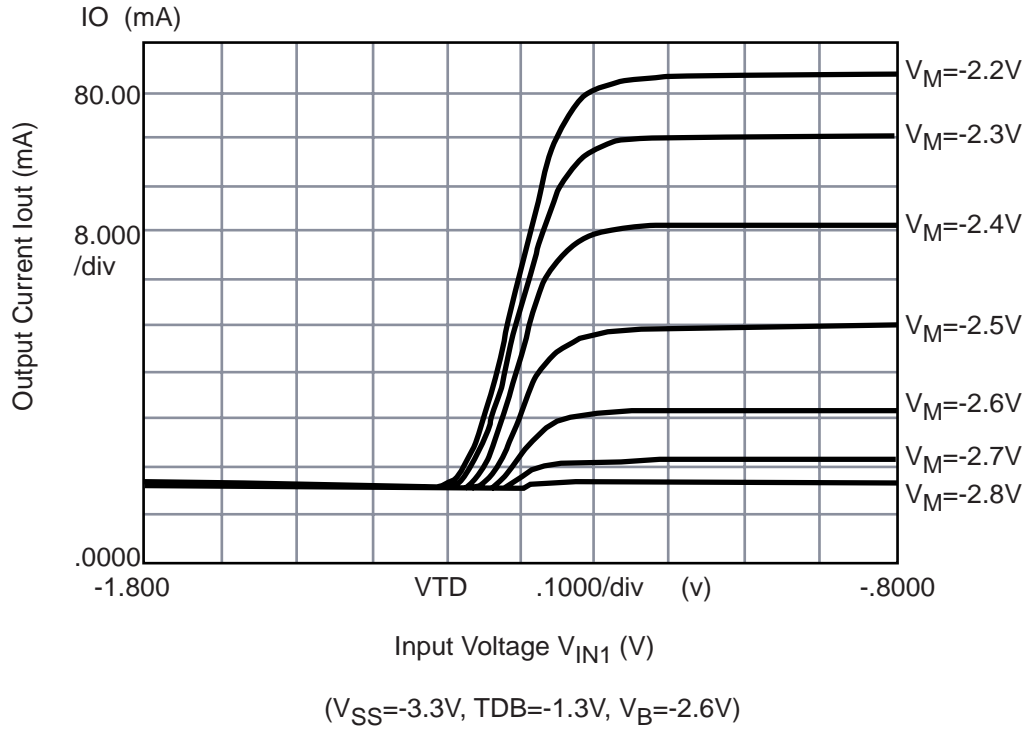| No.	Symbol	Center Coordinates (μm)	No.	Symbol	Center Coordinates (μm)
1	BMN	(80,80)	15	ALMINB	(1040,810)
2	BMP	(240,80)	16	Vreg	(880,810)
3	OUTBIAS	(400,80)	17	V_{SS}	(720,810)
4	OUT	(560,80)	18	TD	(560,810)
5	V_{SS}mod	(720,80)	19	TD (bias)	(400,810)
6	OUTB	(880,80)	20	TDB	(240,810)
7	V_{DD} TEMP	(1040,80)	21	TDB (bias)	(80,810)
8	V_{SS} TEMP	(1200,80)	22	TD	(80,625)
9	VM	(1360,80)	23	V_{DD}	(80,445)
10	VB	(1360,265)	24	V_{SS}bias	(180,265)
11	MARKOUTB	(1360,445)			
12	MARKOUT	(1360,625)			
13	Disable	(1360,810)	O		(0,0)
14	ALMIN	(1200,810)	A		(1440,890)

♦ Test Circuits

Probing System
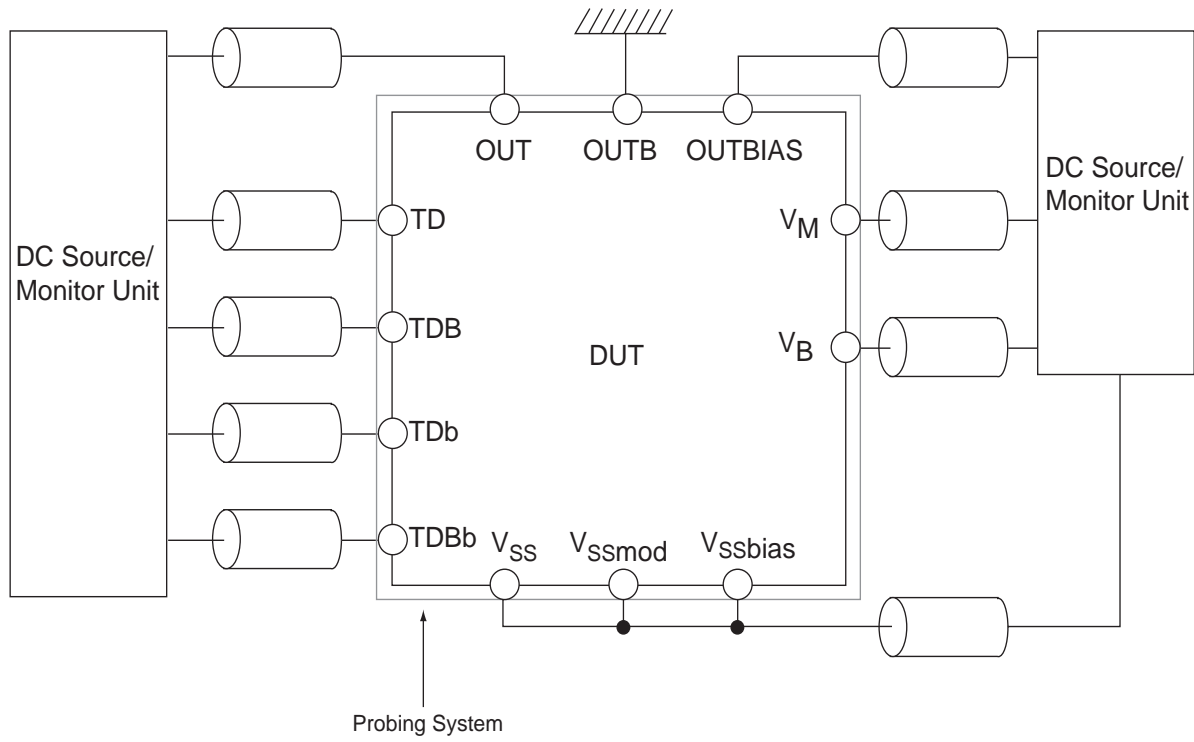
♦ *Typical DC Characteristics*

(1) Switching Characteristics

(a) Modulation Current Switching

IO (mA)

Output Current Iout (mA)

80.00

8.000
/div

.0000

V_M=-2.2V
V_M=-2.3V
V_M=-2.4V
V_M=-2.5V
V_M=-2.6V
V_M=-2.7V
V_M=-2.8V

-1.800   VTD   .1000/div   (v)   -.8000

Input Voltage V_{IN1} (V)

(V_{SS}=-3.3V, TDB=-1.3V, V_B=-2.6V)

(b) Output Current Switching

IO (mA) V_B=-2.2V

Output Current Iout (mA)

80.00

8.000
/div

.0000

V_B=-2.3V
V_B=-2.4V
V_B=-2.5V
V_B=-2.6V
V_B=-2.7V
V_B=-3.3V

-1.800   VTD   .1000/div   (v)   -.8000

Input Voltage V_{IN1} (V)

(V_{SS}=-3.3V, TDB=-1.3V, V_M=-2.5V)

(2) Modulation Current Control

IO (mA)

Modulation Current I$_M$(mA)

80.00

8.000
/div

.0000

-3.500   .1500/div   (v)   -2.000

Control Voltage V$_M$(V)
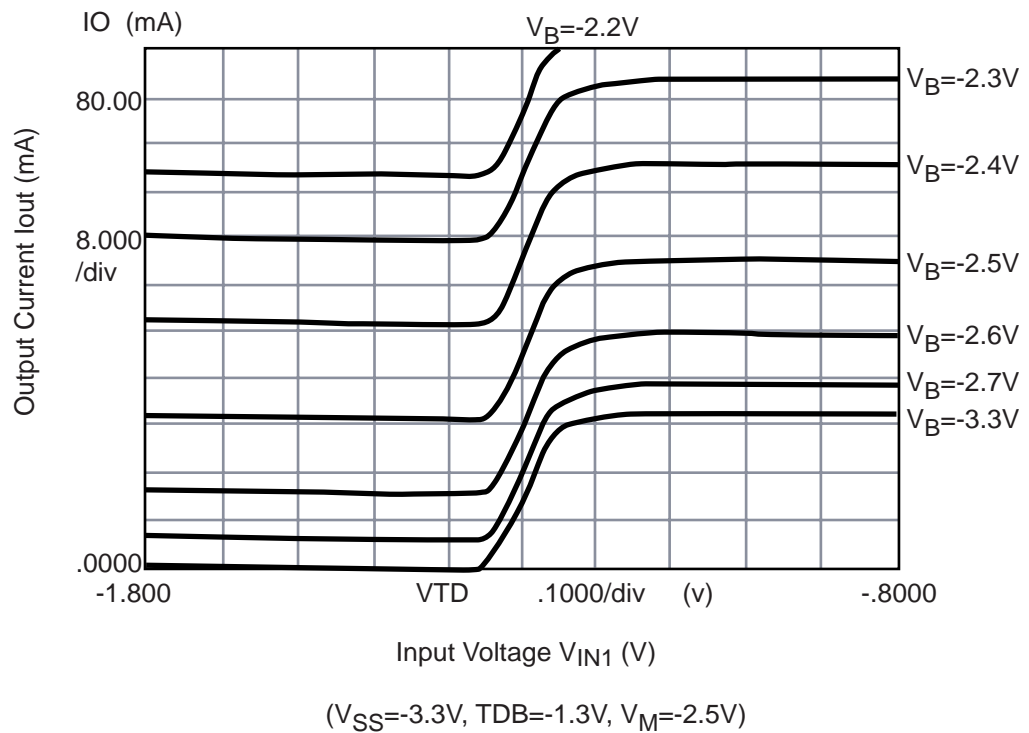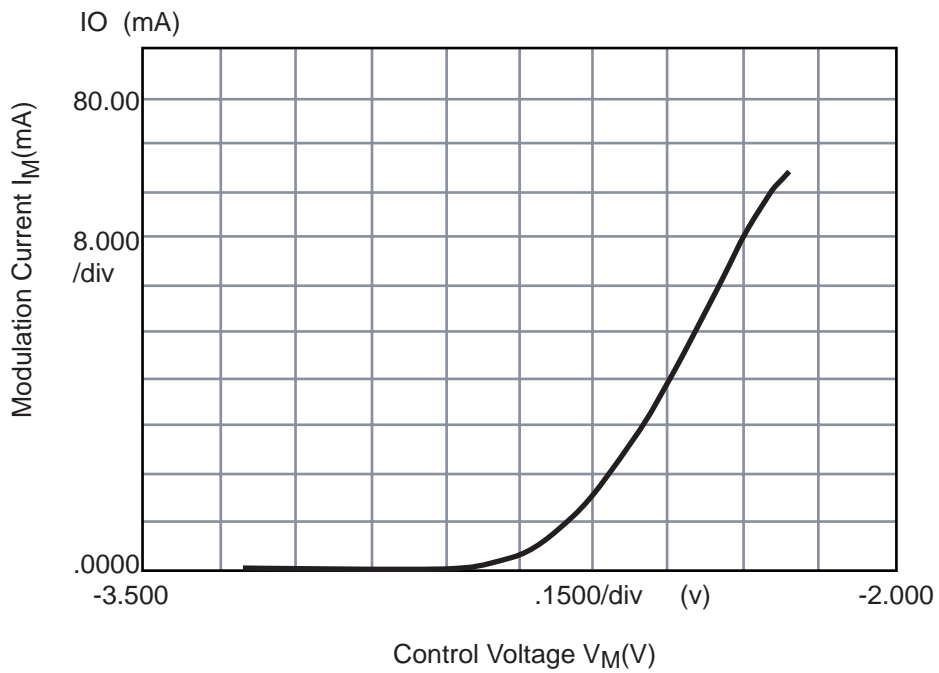
(V$_{SS}$=-3.3V, TD=-1.0V, TDB=-1.6V, OUTBIAS,VB: open)

(3) Bias Current Control

IO (mA)

Bias Current I$_B$ (mA)

80.00

8.000
/div

.0000

-3.500   .1500/div   (v)   -2.000

Control Voltage V$_B$ (V)
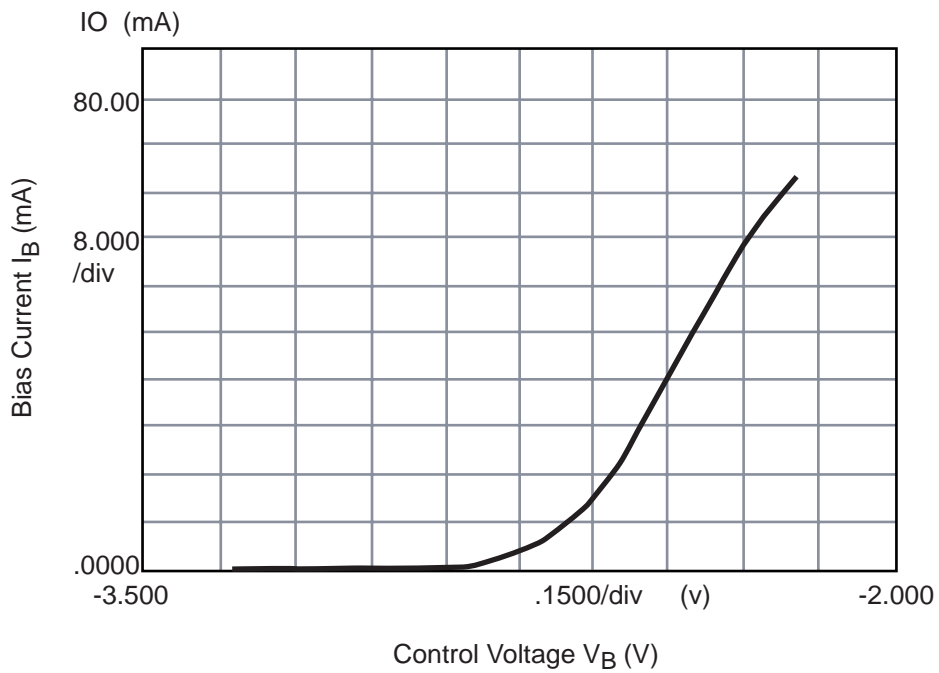
(V$_{SS}$=-3.3V, TD, TDB,V$_M$: open, OUT : open)

(4) The Dependence of Modulation Current on the ambient temperature
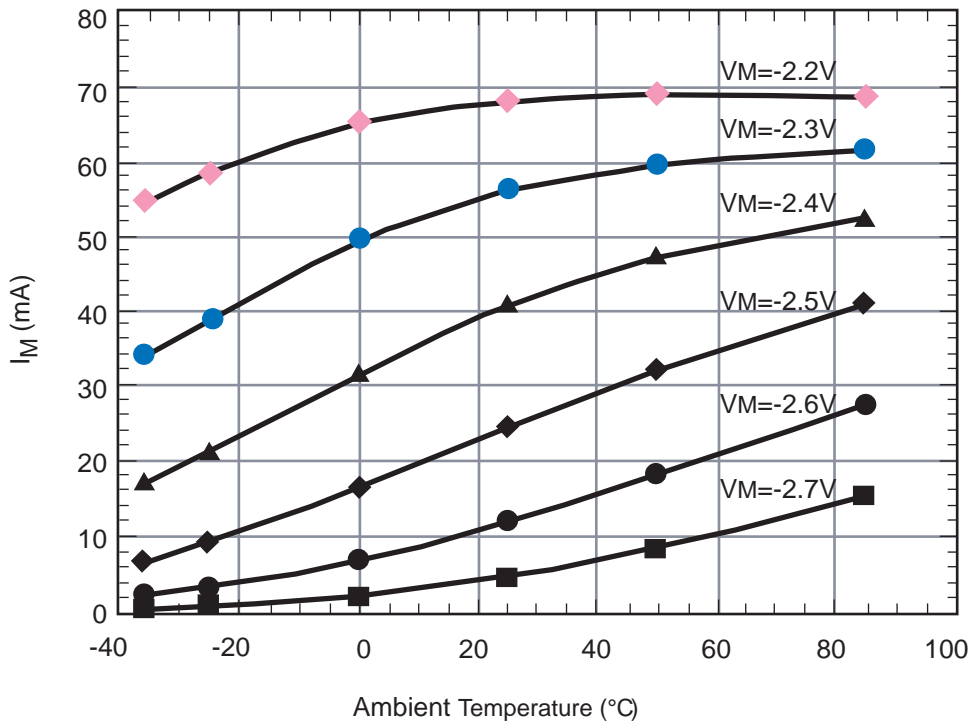
(V_{SS}=-3.3V, TD=-1.0V, TDB=-1.6V, V_B, OUTBIAS: open)

EDD
Electron Device Department