

OCM 2X2, 2X3 SERIES

Bidirectional Optical MOS Relay

GENERAL DESCRIPTION

The OCM2X2 and OCM2X3 Series are bidirectional (AC) optical MOS relays, offering lower drive current than the OCM2X0/2X1 Series. The input portion is a GaAs infrared light emitting diode. The output portion uses a combination of silicon VDMOS (Vertical Diffusion MOS) FETs and silicon photovoltaic devices. An integrated optical coupler performs the isolated I/O switching action; a 5-mA or 10-mA low-level input can control the device's on/off function. The device is encased in an extremely small 6-pin plastic DIP or F-type (gull-wing) package.

The optical MOS relay switch may be used in applications that currently used mechanical relay switches, but offers smaller size, noise-free switching, and electronic circuit compatibility because of its non-mechanical operation. Optical MOS relay switches also dissipate less power than equivalent bipolar devices at lower switching frequencies.

FEATURES

- Low offset voltage
- Large range of current control
- Non-contact, optical operation
- Electronic circuit compatibility
- No chattering or switch bounces
- No mechanical switching noises
- Small size
- Low "on" resistance
- Low drive current (I_{FON} is 5 mA or less)
- High isolation voltage (4 kV for the OCM2X3)

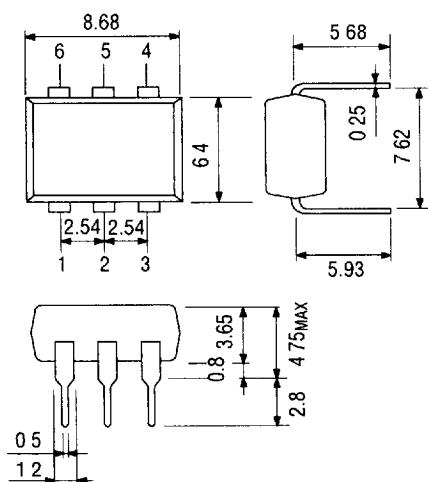
APPLICATIONS

- Computer cards and portable computing applications (such as PCMCIA cards)
- Telecommunications equipment
- Measurement equipment
- Home electronics
- Automatic meter reading equipment
- Other applications requiring small size or high performance
- Other applications requiring non-contact switches

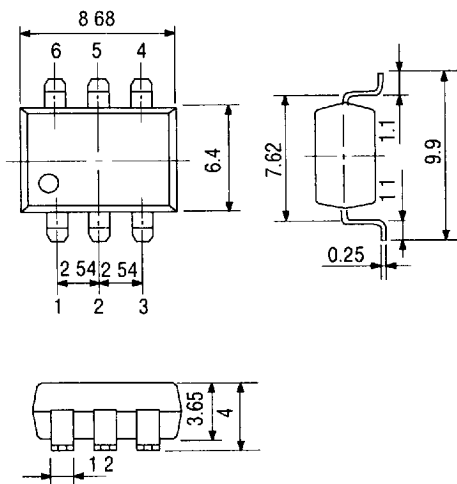
PIN CONFIGURATION

(Unit: mm)

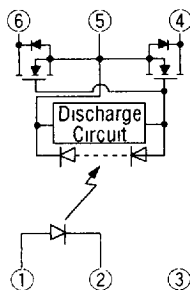
- DIP



- F type (Gull Wing)



- Pin Connection Diagram



- | | |
|------------|-----------|
| 1 Anode | (LED) |
| 2: Cathode | (LED) |
| 3: NC | |
| 4: Drain | (MOS FET) |
| 5: Source | (MOS FET) |
| 6 Drain | (MOS FET) |

ABSOLUTE MAXIMUM RATINGS

(Ambient Temperature Ta=25°C)

Parameter			Symbol	Rating	Unit
LED	Forward Current		I _F	50	mA
	Derating		—	See characteristics curve	mA/°C
	Peak Forward Current *1		I _{FM}	0.5	A
	Reverse Voltage		V _R	5	V
	Power Dissipation		P _{DL}	75	mW
FET	Load Voltage	OCM202, OCM203	V _D	60	V
		OCM212, OCM213		100	
		OCM222, OCM223		200	
		OCM242, OCM243		400	
	Continuous Load Current	OCM202, OCM203	I _D	400	mA
		OCM212, OCM213		350	
		OCM222, OCM223		250	
		OCM242, OCM243		150	
	Derating		—	See characteristics curve	mA/°C
	Surge Forward Current *2	OCM202, OCM203	I _{SUG}	3.5	A
		OCM212, OCM213		1.5	
		OCM222, OCM223			
			OCM242, OCM243		
Power Dissipation			P _D	300	mW
Total Power Dissipation			P _{TOT}	325	mW
Isolation Voltage		OCM202, OCM212	V _{I-O}	1500	V
		OCM222, OCM242		4000	V
		OCM203, OCM213			
		OCM223, OCM243			
Operating Temperature			T _{opr}	−40 to +85	°C
Storage Temperature			T _{stg}	−40 to +100	°C

*1 Pulse width 100 μ s, cycle 10 ms

*2 Pulse width 1 ms, 1 shot

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ELECTRICAL CHARACTERISTICS

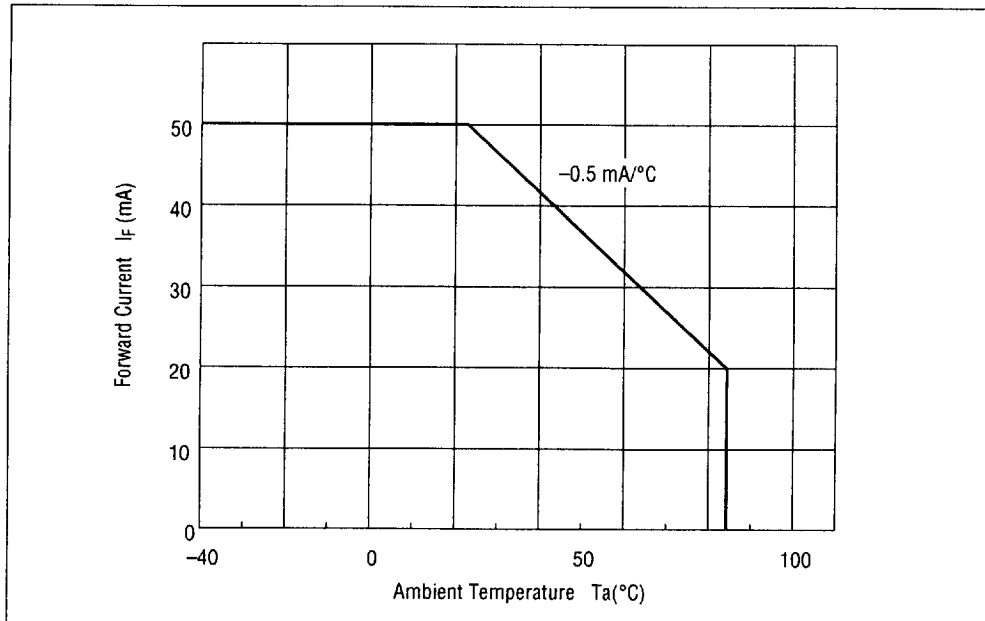
(Ambient Temperature $T_a=25^{\circ}\text{C}$)

Parameter			Symbol	Test Condition	Min.	Typ.	Max.	Unit	Note
LED	Forward Voltage		V _F	I _F =10 mA	1.0	—	1.3	V	—
	Reverse Current		I _R	V _R =5 V	—	—	10	μA	—
FET	ON Resistance	OCM202, OCM203	R _{ON}	I _F =10 mA I _D =100 mA	0.4	0.9	1.5	Ω	Time to flow current is within one second.
		OCM212, OCM213			0.6	1.3	2.0		
		OCM222, OCM223			2.0	3.0	4.0		
		OCM242, OCM243			6.0	9.0	12.5		
	Leakage Current *1	OCM202, OCM203	I _{LEAK}	V _D =60 V	—	—	1.0	μA	—
		OCM212, OCM213		V _D =100 V					
		OCM222, OCM223		V _D =200 V					
		OCM242, OCM243		V _D =400 V					
	Output Capacitance	OCM202, OCM203	C _{OUT}	V _D =50 V f=1 MHz	—	75	—	pF	—
		OCM212, OCM213		—	50	—			
		OCM222, OCM223		—	35	—			
		OCM242, OCM243		—	25	—			
Operating LED Current *2			I _{F ON}	I _D =100 mA	—	—	5	mA	—
Coupled	Returning LED Current	OCM202, OCM203	I _{F OFF}	V _D =60 V I _D =100 μA	0.2	—	—	mA	—
		OCM212, OCM213		V _D =100 V I _D =100 μA					
		OCM222, OCM223		V _D =200 V I _D =100 μA					
		OCM242, OCM243		V _D =400 V I _D =100 μA					
	I/O Capacitance			C _{I-O}	f=1 MHz	—	1.3	—	pF
Turn ON Time *3			t _{ON}	I _F =10 mA I _D =100 mA R _L =100 Ω	—	0.3	1.0	ms	—
Turn OFF Time *3			t _{OFF}		—	0.2	1.0	ms	—

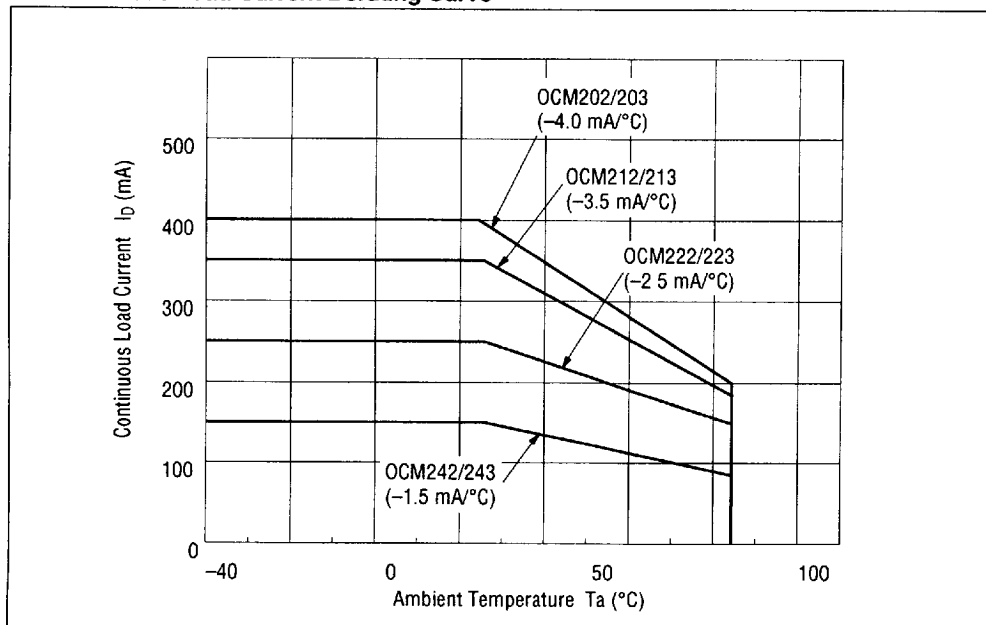
*1 Can correspond to special specification $I_{LEAK} < 1.0\text{ nA}$ *2 Can correspond to special specification $I_{F ON} < 3.0\text{ mA}$ *3 Can correspond to special specification $t_{ON-OFF} < 0.5\text{ ms}$

TYPICAL CHARACTERISTICS

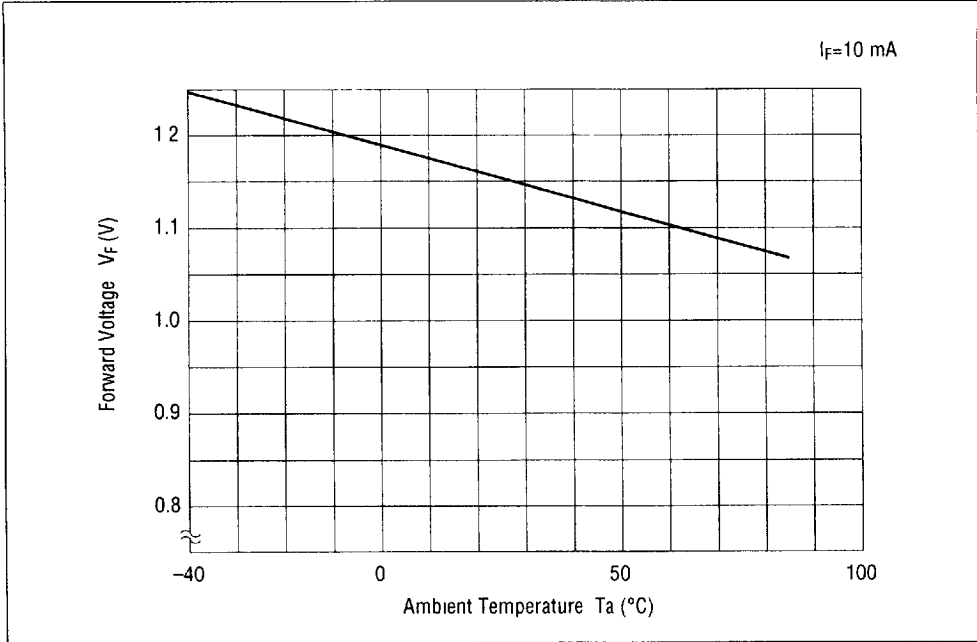
• Forward Current Derating Curve



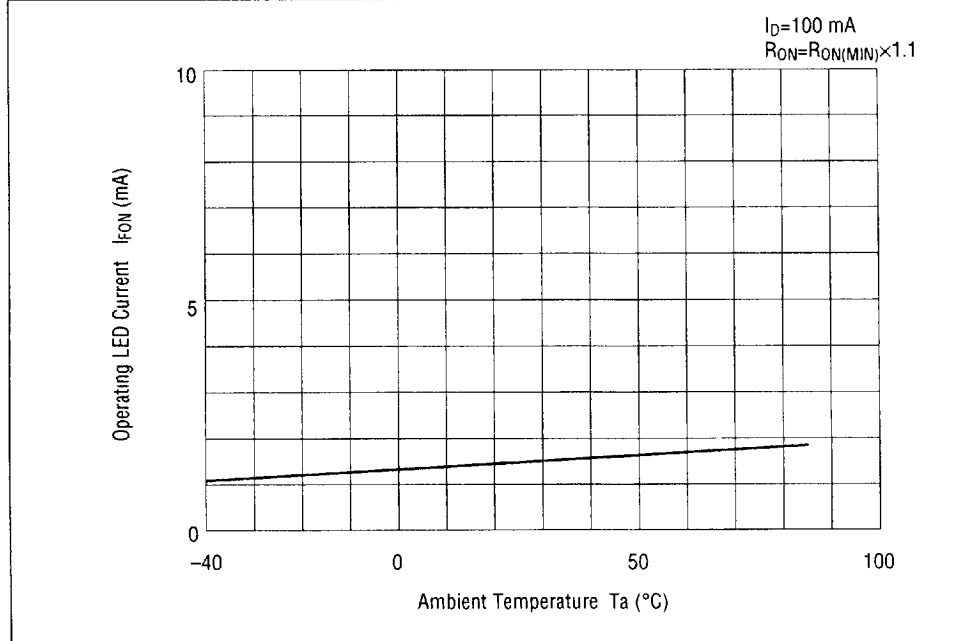
• Continuous Load Current Derating Curve



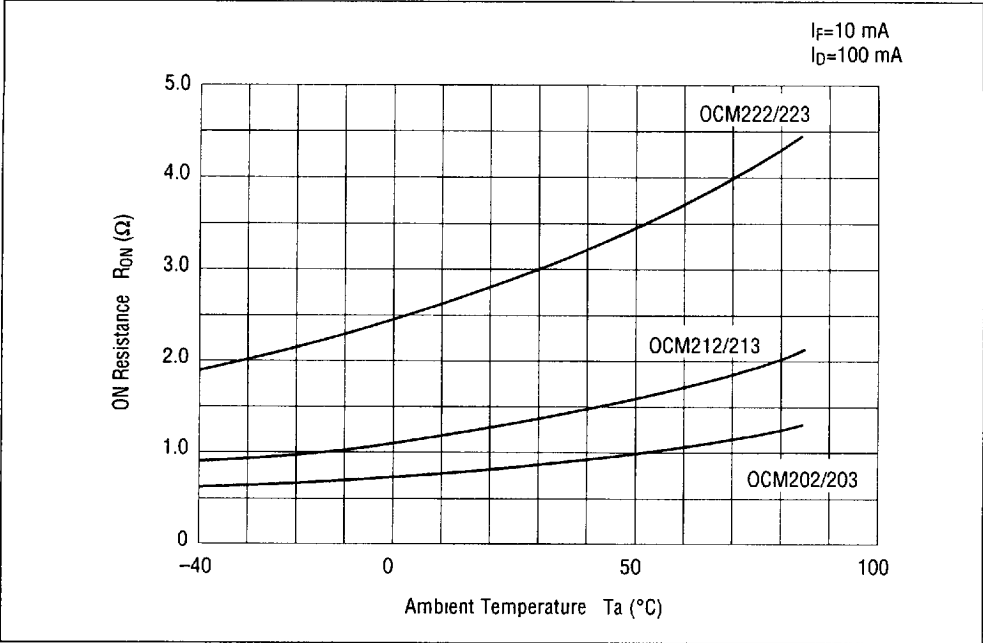
• Forward Voltage vs. Ambient Temperature



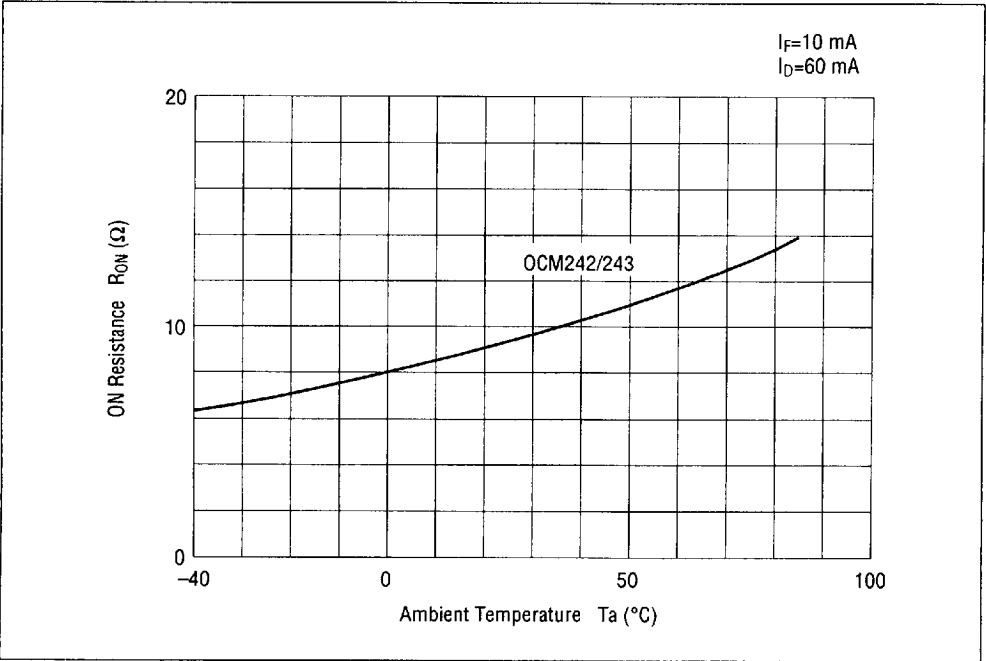
• Operating LED Current vs. Ambient Temperature



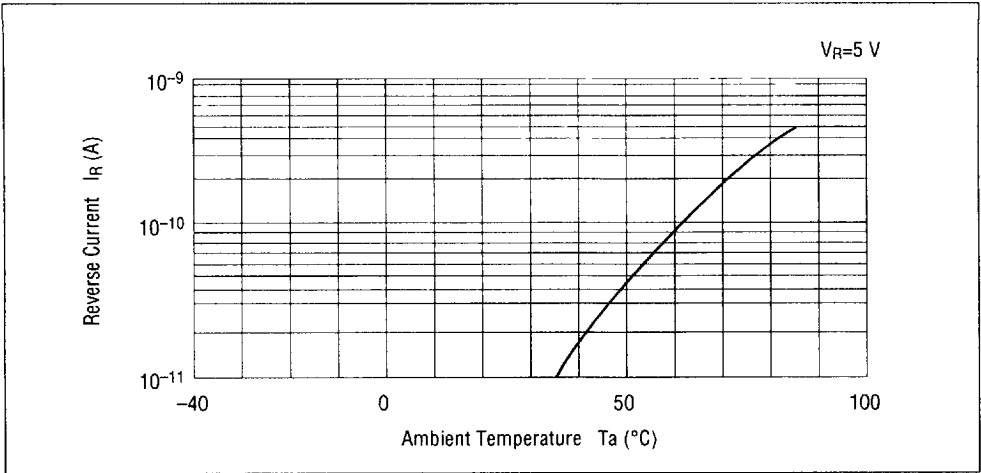
• ON Resistance vs. Ambient Temperature-1



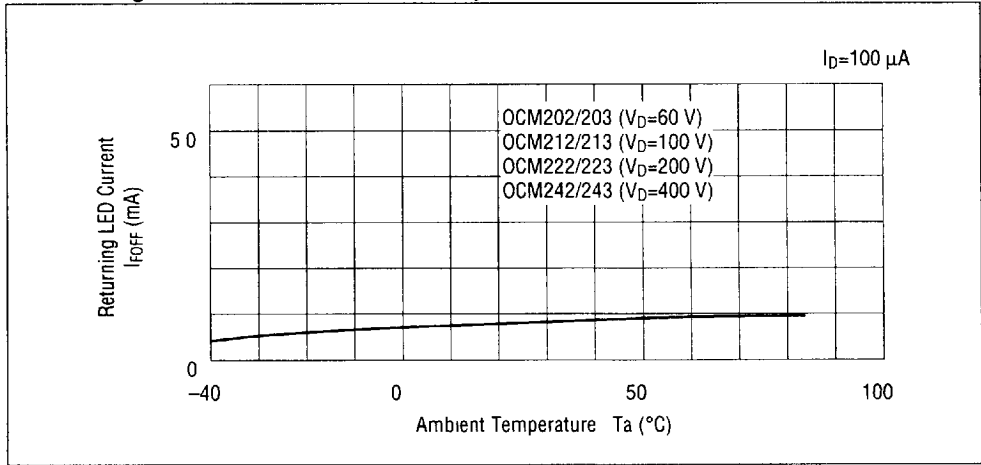
• ON Resistance vs. Ambient Temperature-2



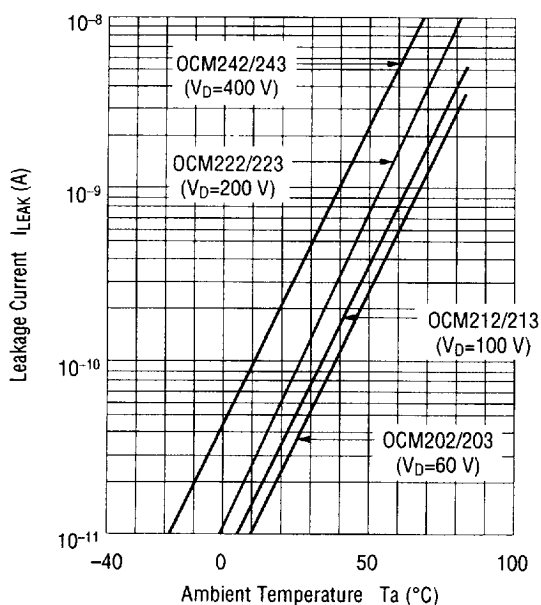
• Reverse Current vs. Ambient Temperature



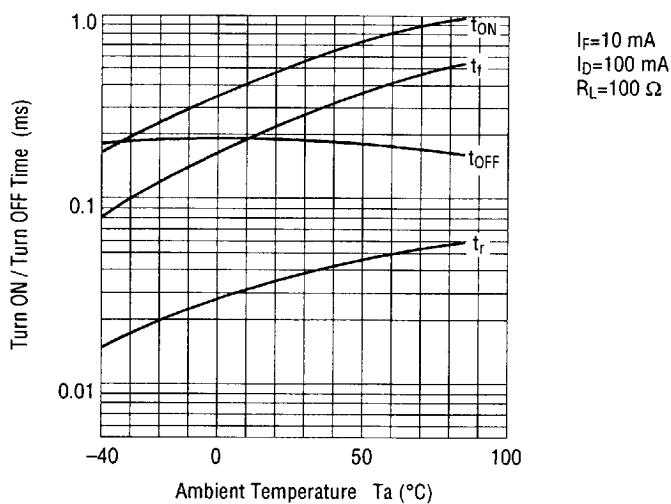
• Returning LED Current vs. Ambient Temperature



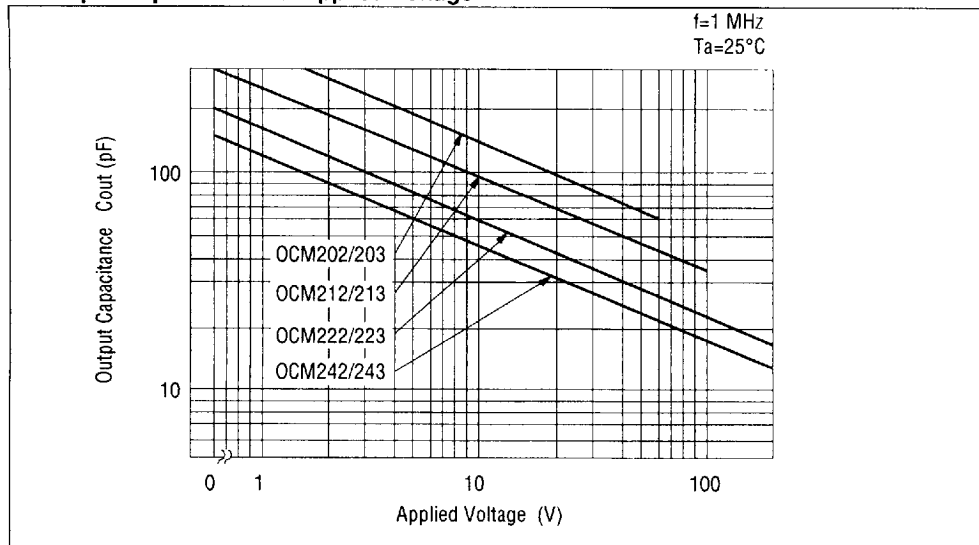
- Leakage Current vs. Ambient Temperature



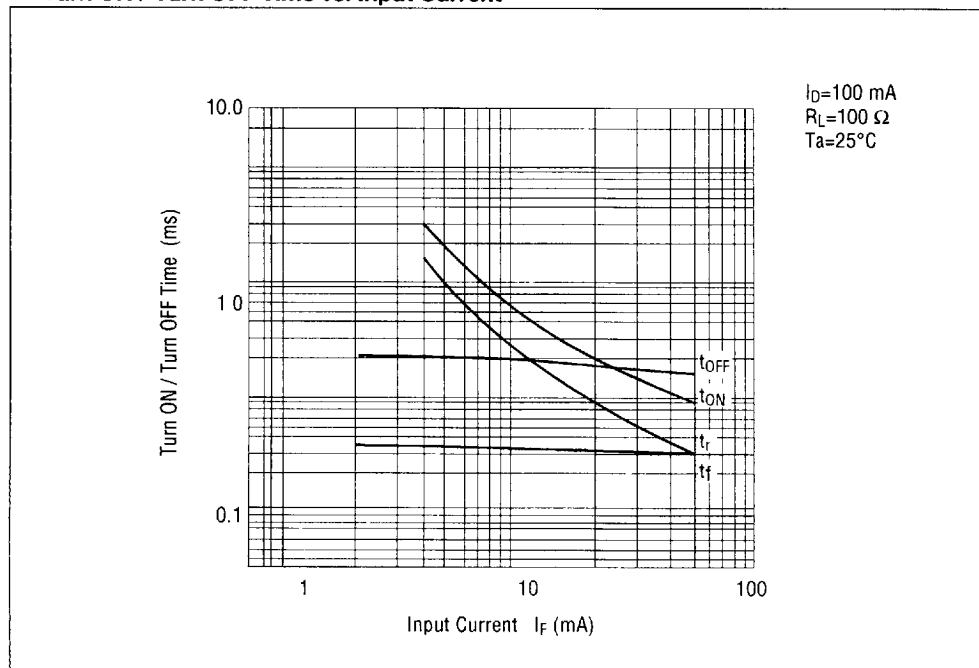
- Turn ON / Turn OFF Time vs. Ambient Temperature



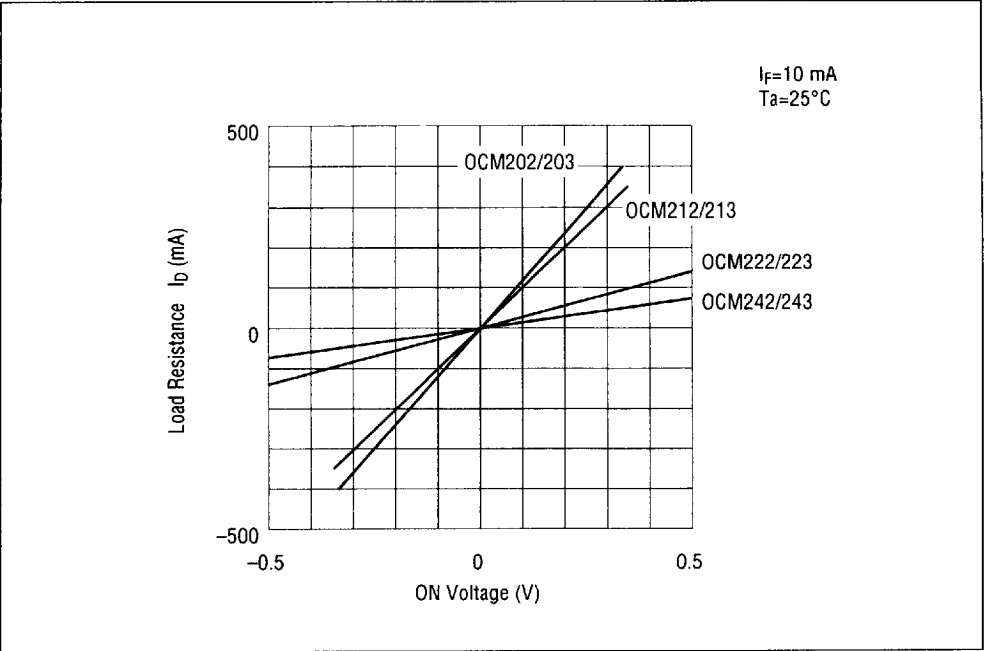
- Output Capacitance vs. Applied Voltage



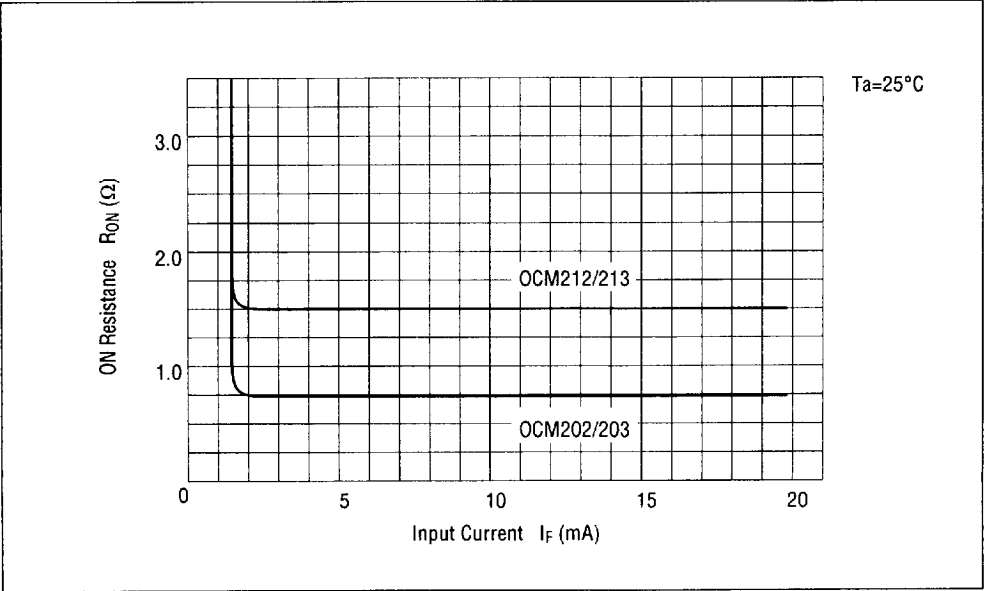
- Turn ON / Turn OFF Time vs. Input Current



• Load Current vs. Voltage

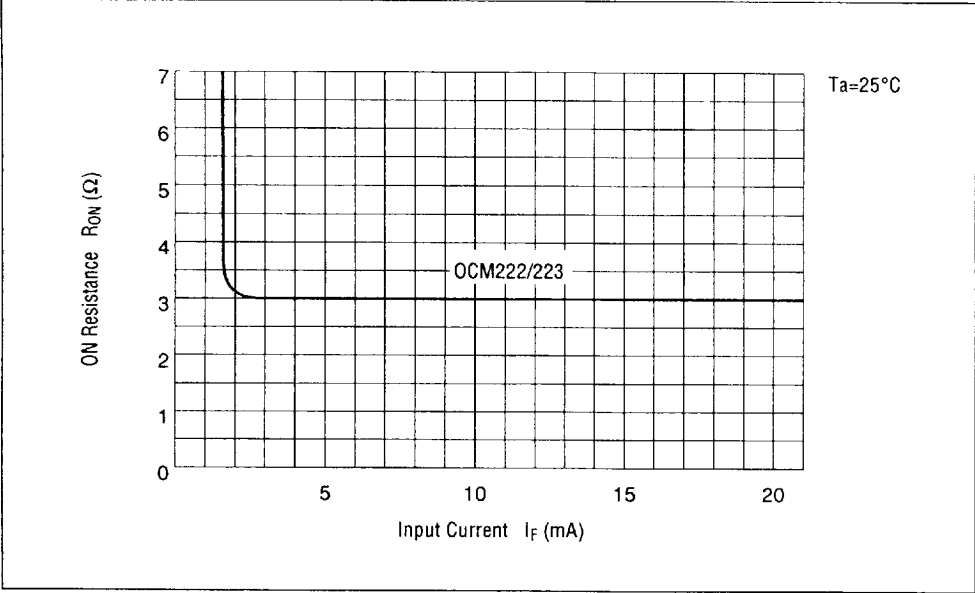


• ON Resistance vs. Input Current-1

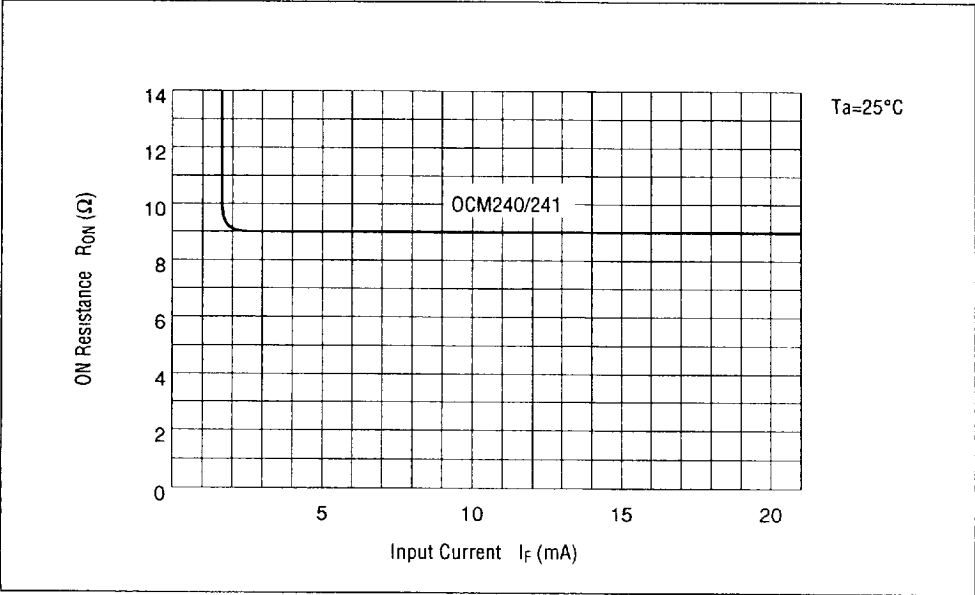


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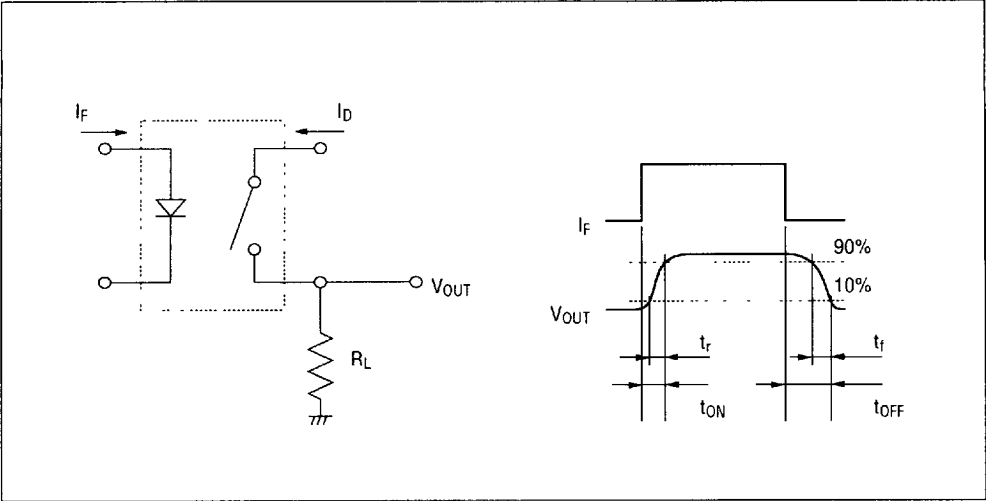
• ON Resistance vs. Input Current-2



• ON Resistance vs. Input Current-3



• Circuit for Measuring Response Characteristics



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