OCM 2X4, 2X5 SERIES

Bidirectional Optical MOS Relay

GENERAL DESCRIPTION

The OCM2X4 and OCM2X5 Series are bidirectional (AC) optical MOS relays that provide high-speed response and are capable of handling high-frequency signals. 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 use 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

- Infinitesimally small control voltage
- Excellent high-frequency characteristics (>30 dB isolation at 10 MHz)
- High-speed switching response of 200 μs or less
- Low leakage current of 1 nA or less
- Low drive current of 5 mA or less
- Electronic circuit compatibility
- No mechanical switching noises
- Small size
- Low "on" resistance
- High isolation voltage (4 kV for the OCM2X5)

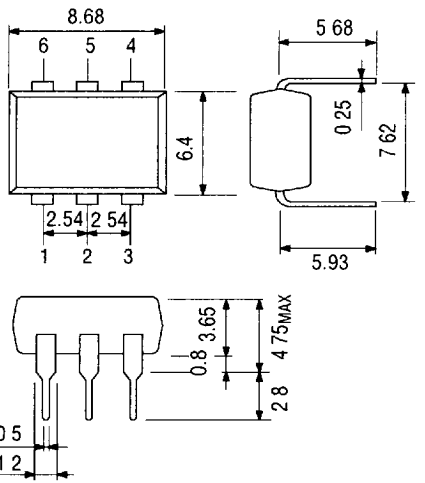
APPLICATIONS

- 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

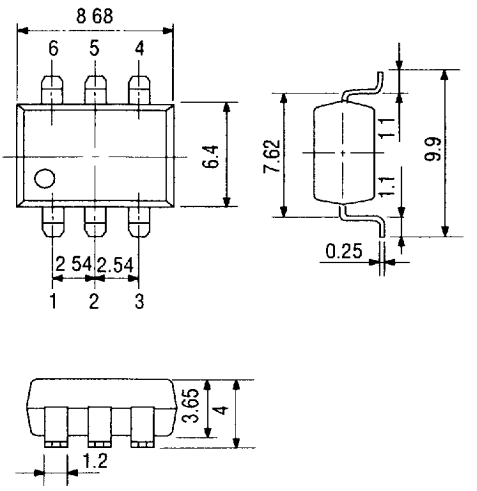
PIN CONFIGURATION

(Unit: mm)

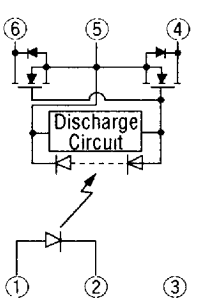
• DIP



• 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	OCM204, OCM205	V_D	60	V
		OCM214, OCM215		100	
		OCM224, OCM225		200	
		OCM244, OCM245		400	
	Continuous Load Current	OCM204, OCM205	I_D	80	mA
		OCM214, OCM215		50	
		OCM224, OCM225		40	
		OCM244, OCM245		15	
	Derating		—	See characteristics curve	mA/°C
	Surge Load Current *2	OCM204, OCM205 OCM214, OCM215	I_{SUG}	0.1	A
		OCM224, OCM225		0.07	
		OCM244, OCM245		0.025	
	Power Dissipation		P_D	300	mW
Total Power Dissipation			P_{TOT}	325	mW
Isolation Voltage		OCM204, OCM214 OCM224, OCM244	V_{I-O}	1500	V
		OCM205, OCM215 OCM225, OCM245		4000	V
Operating Temperature			T_{opr}	−40 to +85	°C
Storage Temperature			T_{stg}	−40 to +100	°C

*1 Pulse width 100 μs, cycle 10 ms
*2 Pulse width 1 ms, 1 shot

ELECTRICAL CHARACTERISTICS

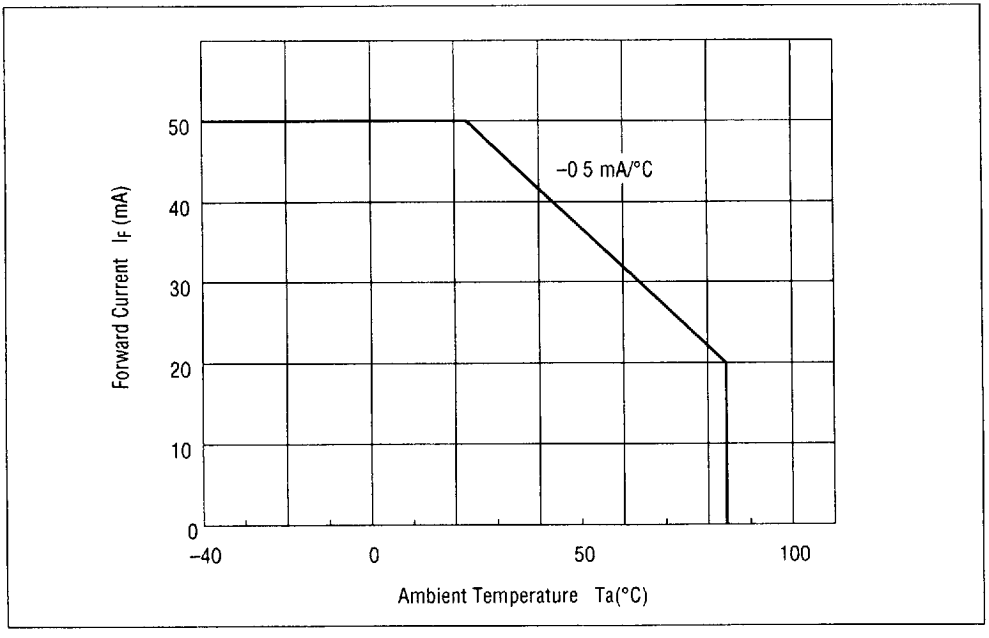
(Ambient Temperature Ta=25°C)

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	OCM204, OCM205	R_{ON}	I_F=10 mA I_D=Rating	20	30	40	Ω	Time to flow current is within one second.
		OCM214, OCM215			40	65	90		
		OCM224, OCM225			100	150	200		
		OCM244, OCM245			300	600	900		
	Leakage Current *1	OCM204, OCM205	I_{LEAK}	V_D=60 V	—	—	10	nA	—
		OCM214, OCM215		V_D=100 V					
		OCM224, OCM225		V_D=200 V					
		OCM244, OCM245		V_D=400 V					
	Output Capacitance		C_{OUT}	V_D=50 V f=1 MHz	—	7	—	pF	—
Coupled	Operating LED Current *2		$I_{F\,ON}$	I_D=Rating	—	—	5	mA	—
	Returning LED Current	OCM204, OCM205	$I_{F\,OFF}$	V_D=60 V I_D=100 μA	0.2	—	—	mA	—
		OCM214, OCM215		V_D=100 V I_D=100 μA					
		OCM224, OCM225		V_D=200 V I_D=100 μA					
		OCM244, OCM245		V_D=400 V I_D=100 μA					
	I/O Capacitance		C_{I-O}	f=1 MHz	—	1.3	—	pF	—
	Turn ON Time		t_{ON}	I_F=10 mA I_D=Rating R_L=5 kΩ	—	30	200	μs	—
	Turn OFF Time		t_{OFF}		—	60	200	μs	—

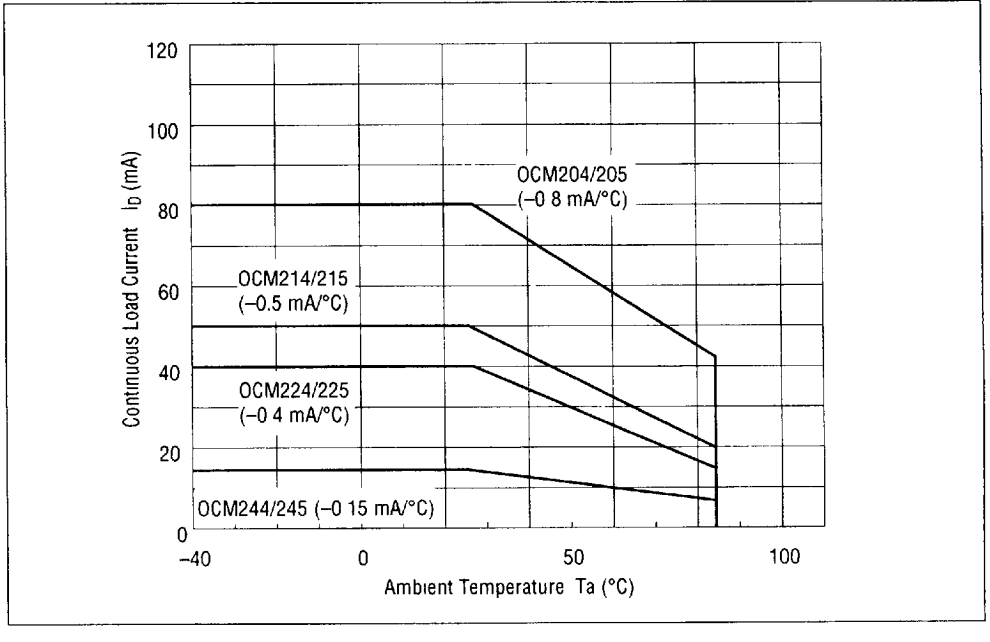
*1 Can correspond to special specification I_{LEAK} < 0.1 nA
*2 Can correspond to special specification I_{FON} < 3.0 mA

TYPICAL CHARACTERISTICS

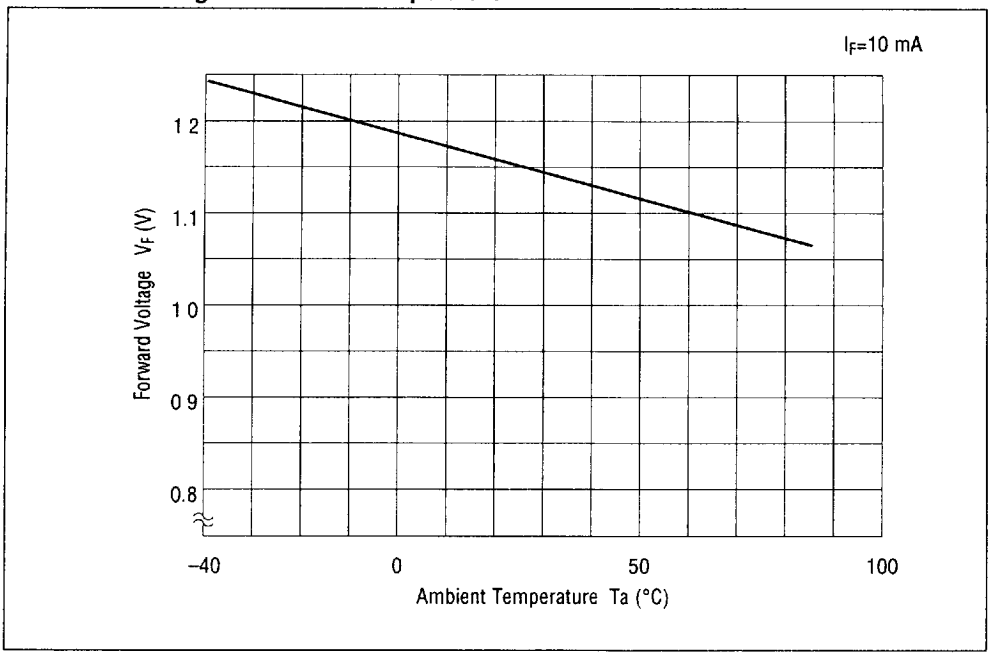
- **Forward Current Derating Curve**



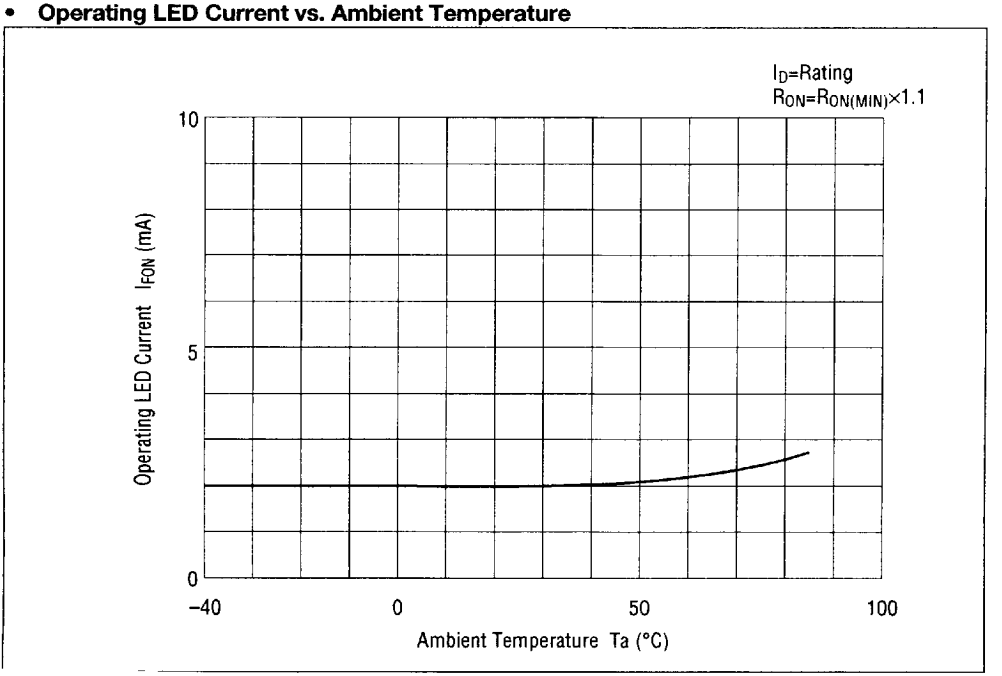
- **Continuous Load Current Derating Curve**



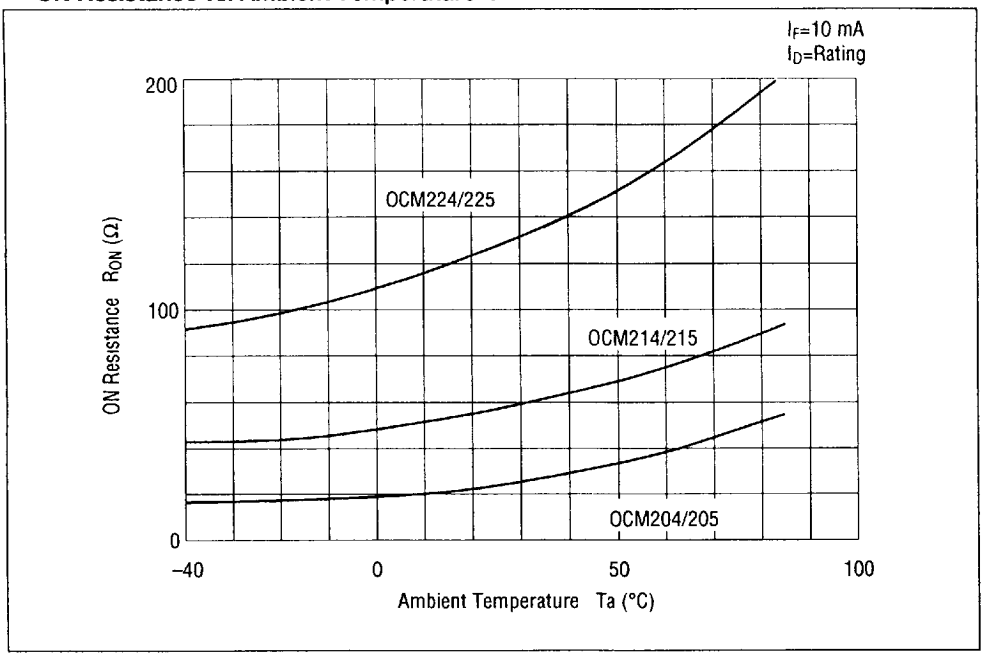
- **Forward Voltage vs. Ambient Temperature**



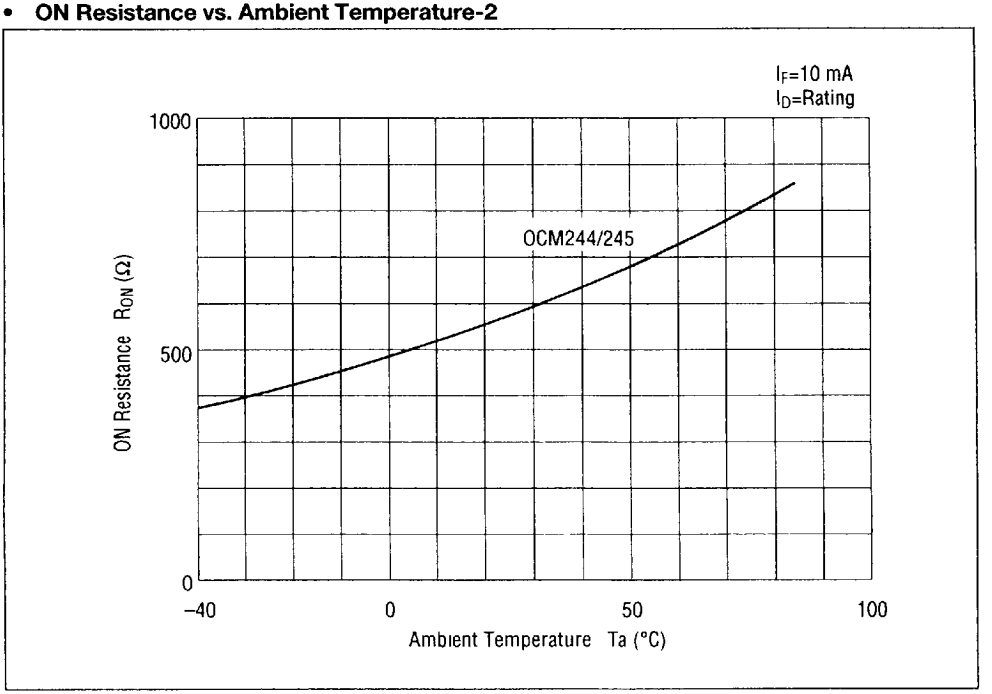
- **Operating LED Current vs. Ambient Temperature**



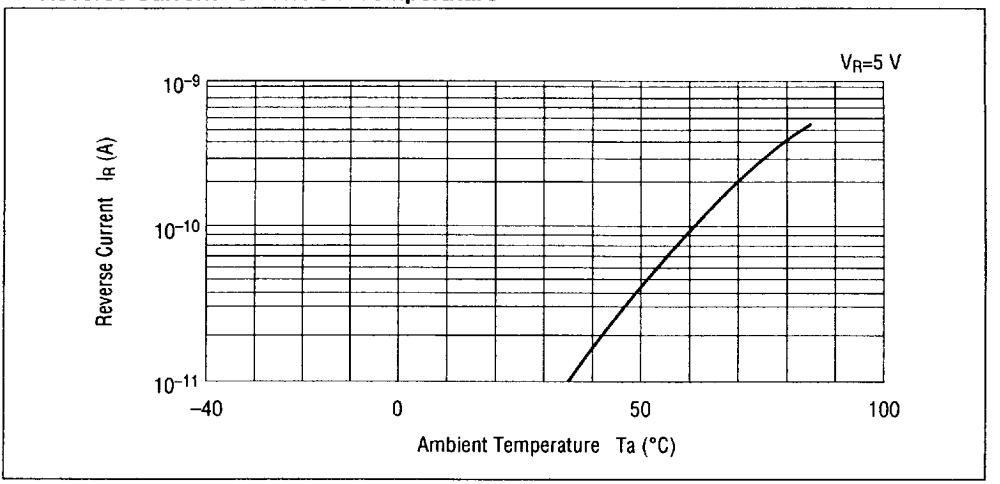
- **ON Resistance vs. Ambient Temperature-1**



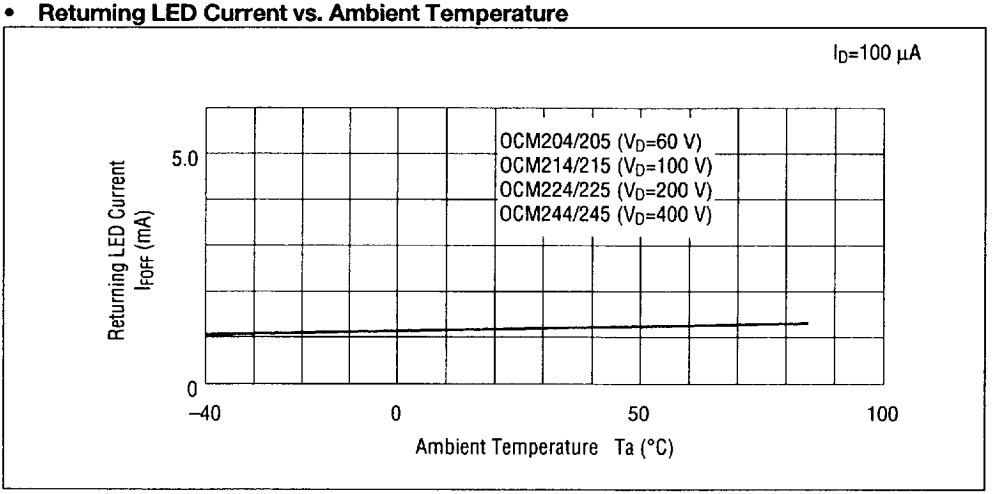
- **ON Resistance vs. Ambient Temperature-2**



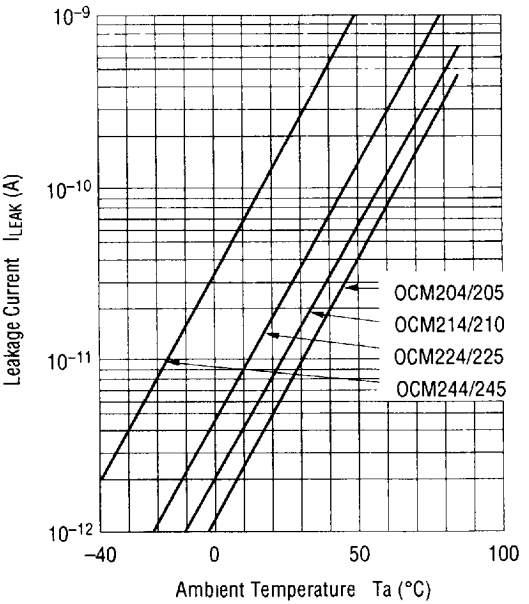
- **Reverse Current vs. Ambient Temperature**



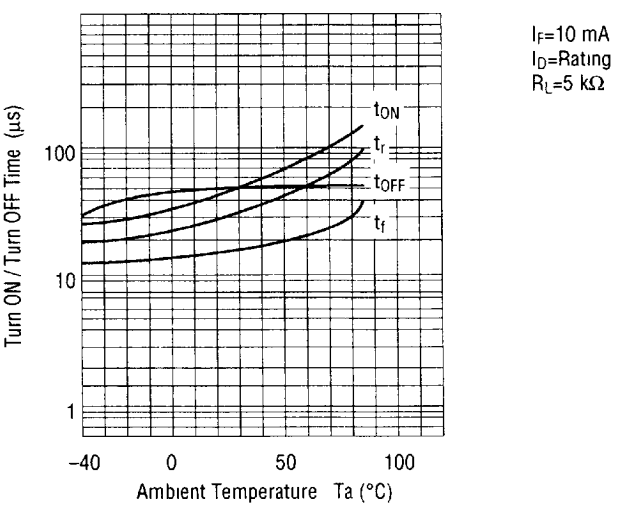
- **Returning LED Current vs. Ambient Temperature**



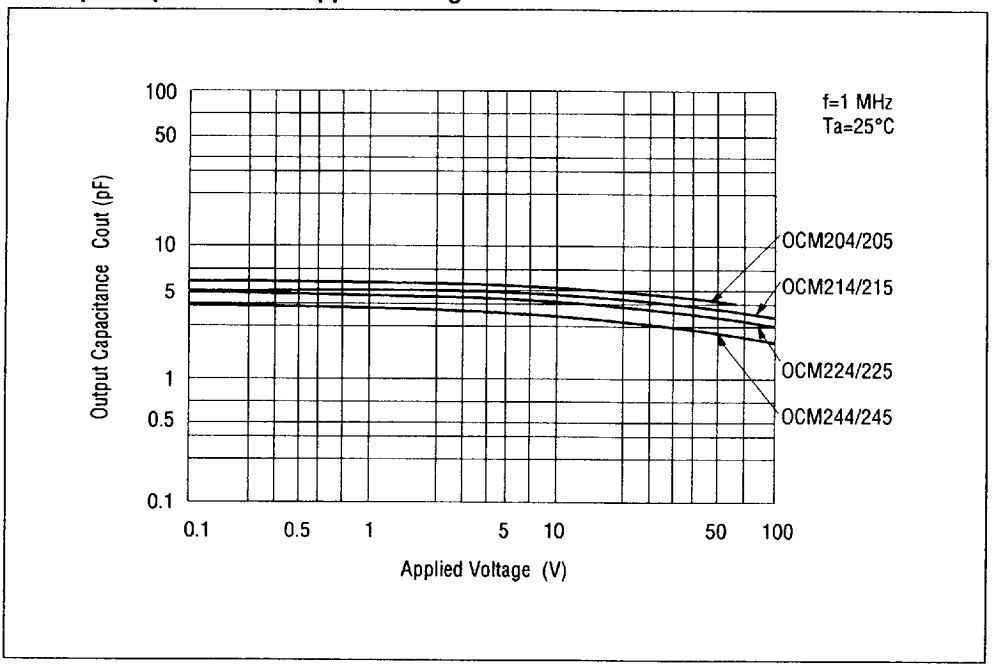
- **Leakage Current vs. Ambient Temperature**



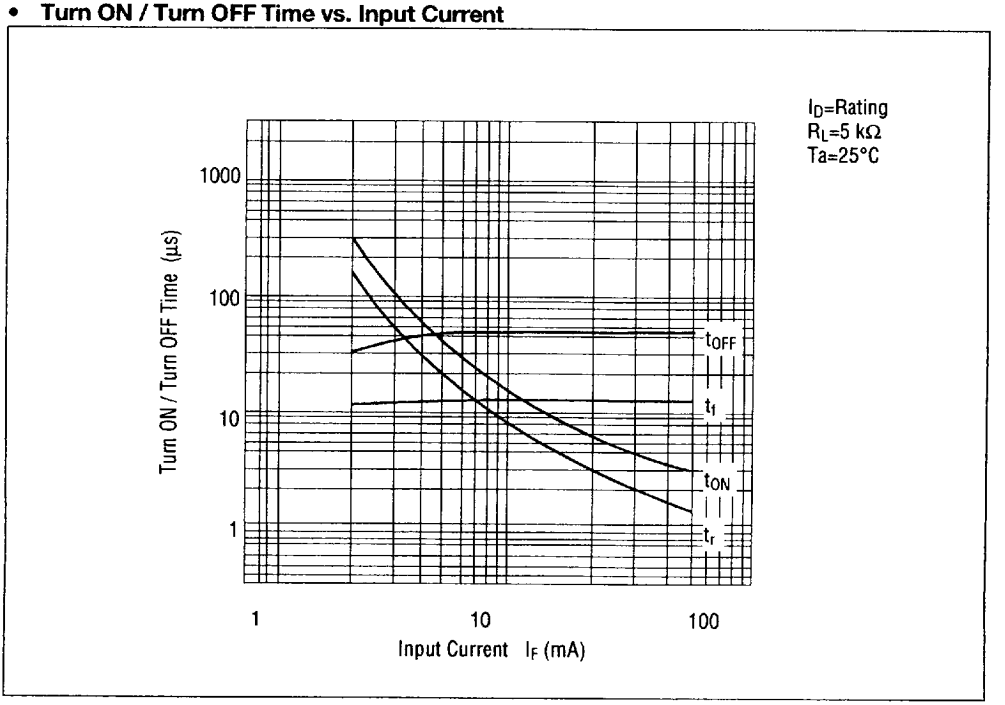
- **Turn ON / Turn OFF Time vs. Ambient Temperature**



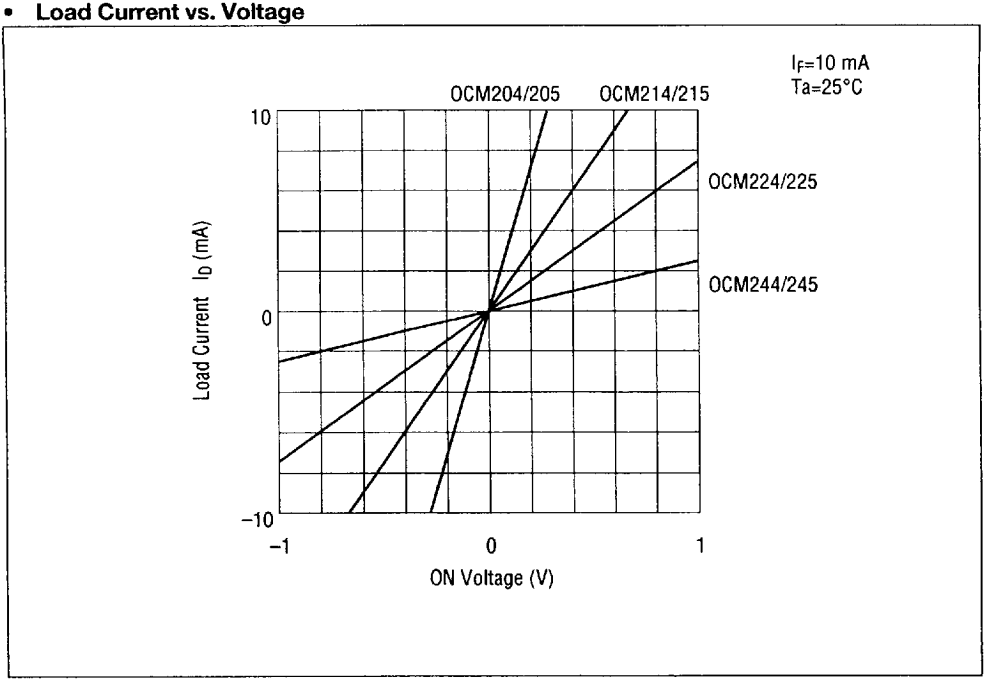
- **Output Capacitance vs. Applied Voltage**



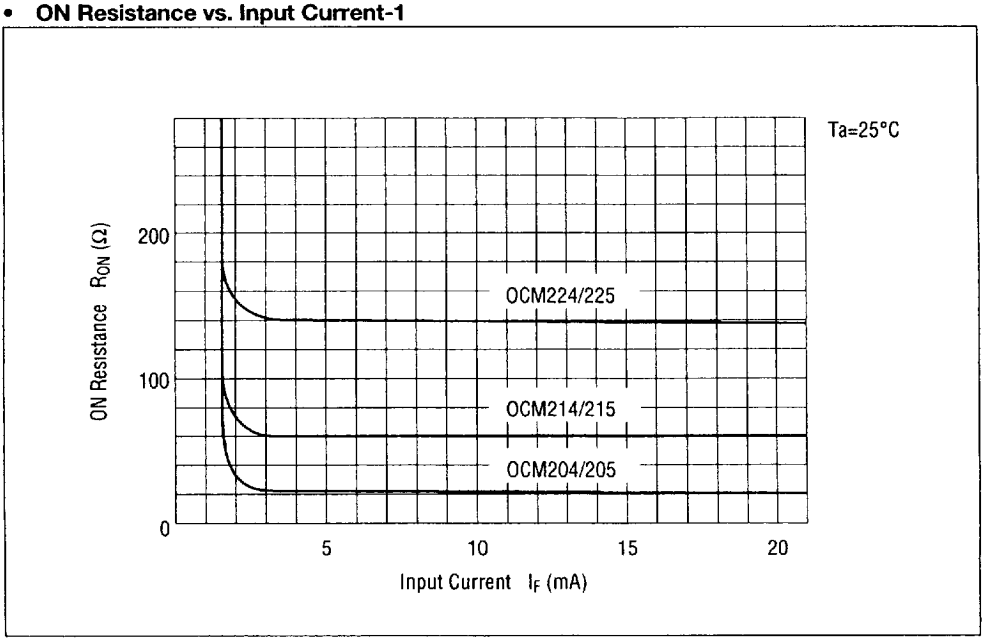
- **Turn ON / Turn OFF Time vs. Input Current**



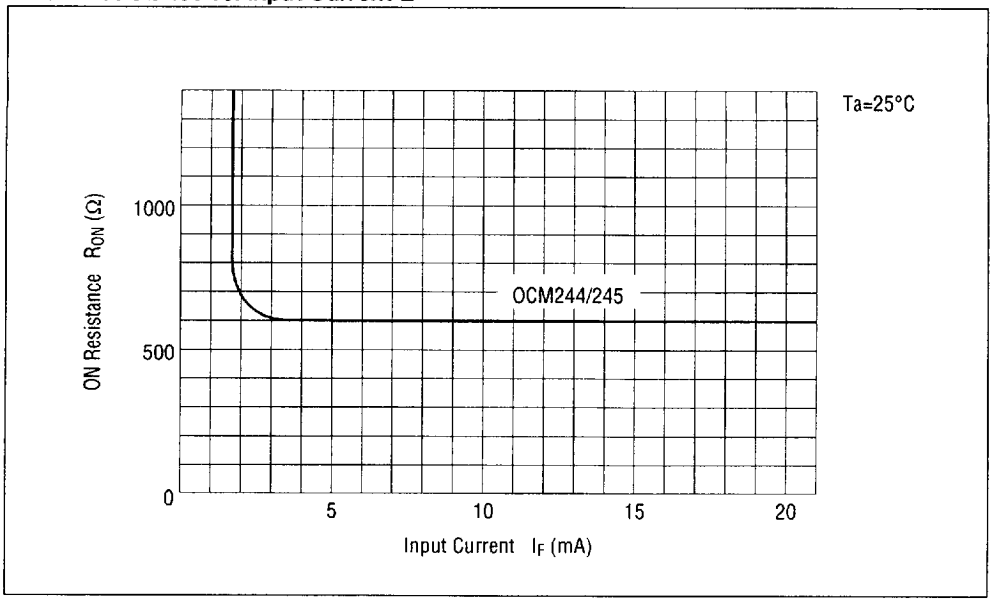
- **Load Current vs. Voltage**



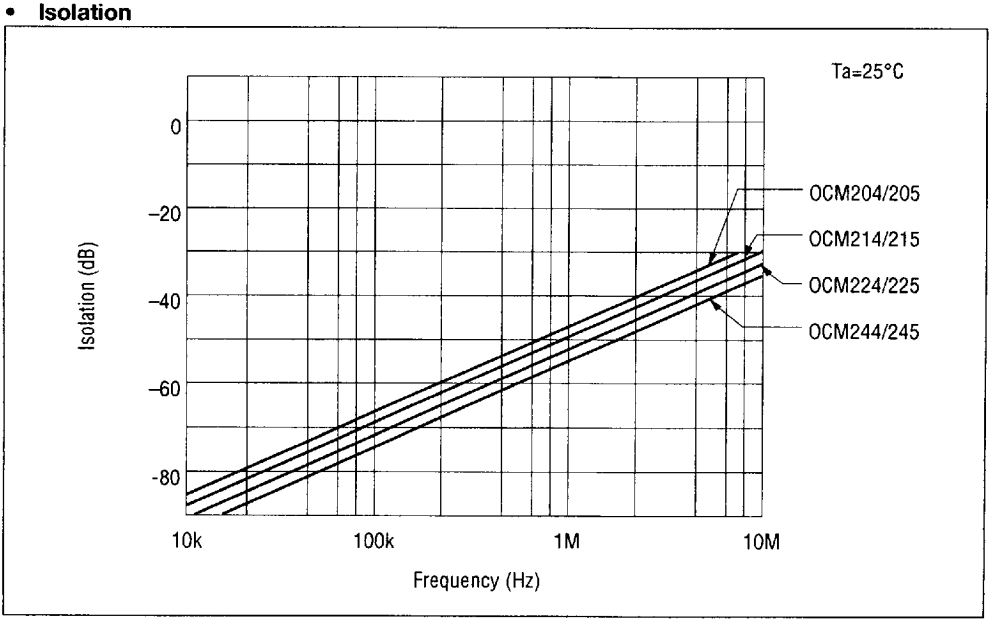
- **ON Resistance vs. Input Current-1**



- **ON Resistance vs. Input Current-2**



- **Isolation**



- **Insertion Loss**