

OKI electronic components

OCM 1X0, 1X1 SERIES

Unidirectional Optical MOS Relay

GENERAL DESCRIPTION

The OCM1X0 and OCM1X1 Series are unidirectional (DC) optical MOS relays. 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

- 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
- High isolation voltage (4 kV for the OCM1X1)

APPLICATIONS

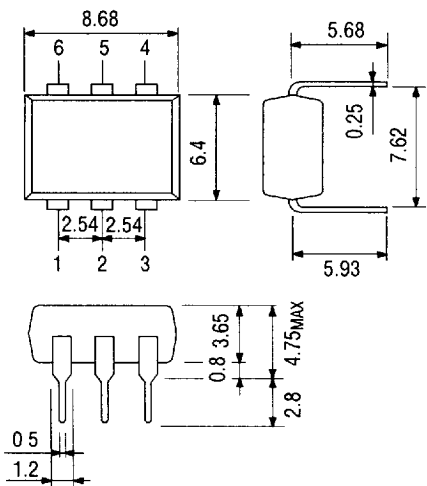
- Computer cards and portable computing applications (such as PCMCIA cards)
- Telecommunications equipment
- Measurement equipment
- Home electronics
- Automatic meter reading equipment
- Other applications requiring small size or high performance
- Other applications requiring non-contact switches

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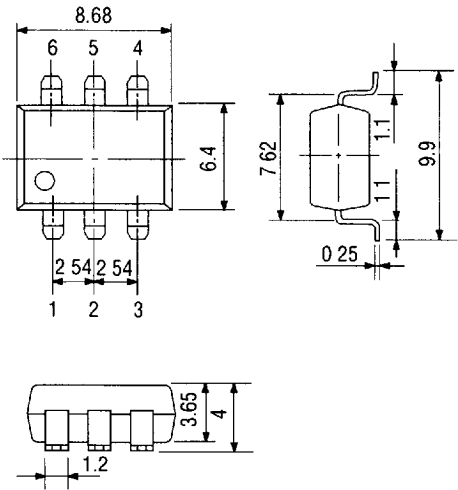
PIN CONFIGURATION

(Unit: mm)

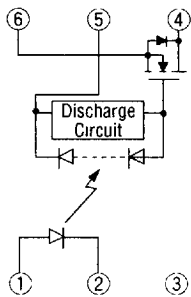
• DIP Type



• 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	OCM100, OCM101	V _D	60	V
		OCM110, OCM111		100	
		OCM120, OCM121		200	
		OCM140, OCM141		400	
	Continuous Load Current	OCM100, OCM101	I _D	500	mA
		OCM110, OCM111		450	
		OCM120, OCM121		350	
		OCM140, OCM141		200	
	Derating		—	See characteristics curve	mA/°C
	Surge Load Current *2	OCM100, OCM101	I _{SUG}	3.5	A
		OCM110, OCM111			
		OCM120, OCM121		1.5	
		OCM140, OCM141			
Power Dissipation		P _D	300	mW	
Total Power Dissipation			P _{TOT}	325	mW
Isolation Voltage		OCM100, OCM110	V _{I-O}	1500	V
		OCM120, OCM140			
		OCM101, OCM111		4000	V
OCM121, OCM141					
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

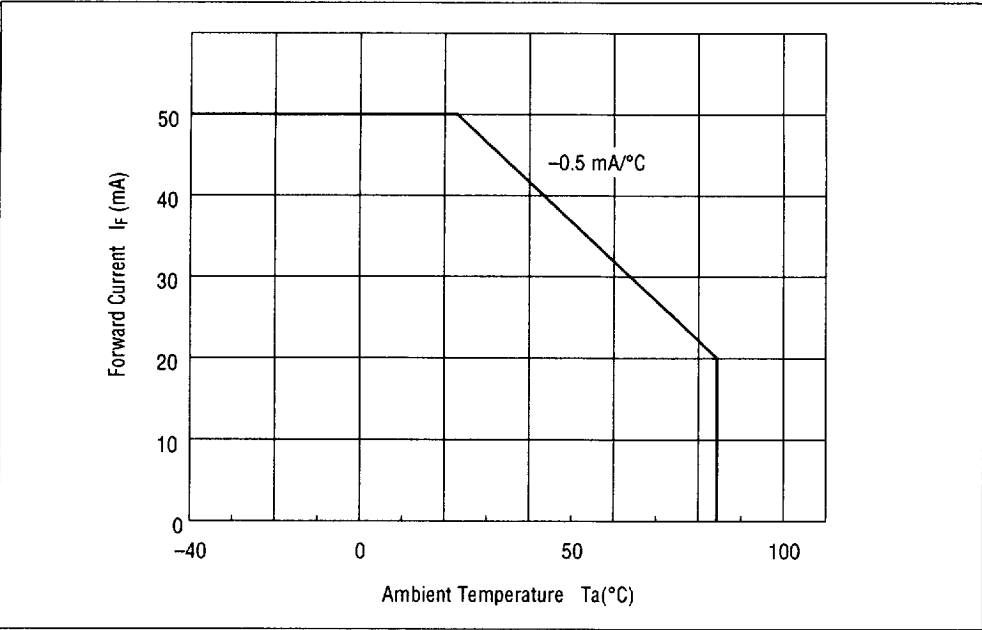
(Ambient Temperature $T_a=25^{\circ}\text{C}$)

Parameter			Symbol	Test Condition	Min.	Typ.	Max.	Unit	Note
LED	Forward Voltage		V_F	$I_F=10\text{ mA}$	1.0	—	1.3	V	—
	Reverse Current		I_R	$V_R=5\text{ V}$	—	—	10	μA	—
FET	ON Resistance	OCM100, OCM101	R_{ON}	$I_F=10\text{ mA}$ $I_D=100\text{ mA}$	0.2	0.5	0.75	Ω	Time to flow current is within one second.
		OCM110, OCM111			0.3	0.7	1.0		
		OCM120, OCM121			1.0	1.5	2.0		
		OCM140, OCM141			3.0	4.5	6.2		
	Leakage Current *	OCM100, OCM101	I_{LEAK}	$V_D=60\text{ V}$	—	—	1.0	μA	—
		OCM110, OCM111		$V_D=100\text{ V}$					
		OCM120, OCM121		$V_D=200\text{ V}$					
		OCM140, OCM141		$V_D=400\text{ V}$					
	Output Capacitance	OCM100, OCM101	C_{OUT}	$V_D=50\text{ V}$ $f=1\text{ MHz}$	—	70	—	pF	—
		OCM110, OCM111			—	50	—		
		OCM120, OCM121			—	35	—		
		OCM140, OCM141			—	25	—		
Coupled	Operating LED Current		$I_{F\text{ ON}}$	$I_D=100\text{ mA}$	—	—	10	mA	—
	Returning LED Current	OCM100, OCM101	$I_{F\text{ OFF}}$	$V_D=60\text{ V}$ $I_D=100\text{ }\mu\text{A}$	0.5	—	—	mA	—
		OCM110, OCM111		$V_D=100\text{ V}$ $I_D=100\text{ }\mu\text{A}$					
		OCM120, OCM121		$V_D=200\text{ V}$ $I_D=100\text{ }\mu\text{A}$					
		OCM140, OCM141		$V_D=400\text{ V}$ $I_D=100\text{ }\mu\text{A}$					
	I/O Capacitance		C_{I-O}	$f=1\text{ MHz}$	—	13	—	pF	—
	Turn ON Time		t_{ON}	$I_F=10\text{ mA}$ $I_D=100\text{ mA}$	—	0.3	—	ms	—
	Turn OFF Time		t_{OFF}	$R_L=100\text{ }\Omega$	—	25	—	ms	—

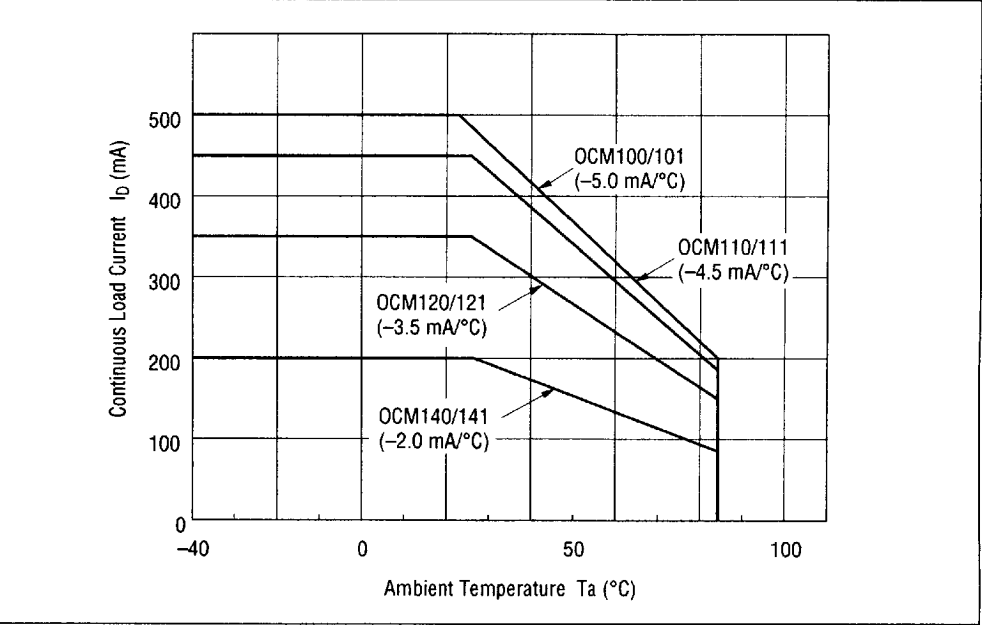
* Can correspond to special specification $I_{LEAK} < 1.0\text{ nA}$

TYPICAL CHARACTERISTICS

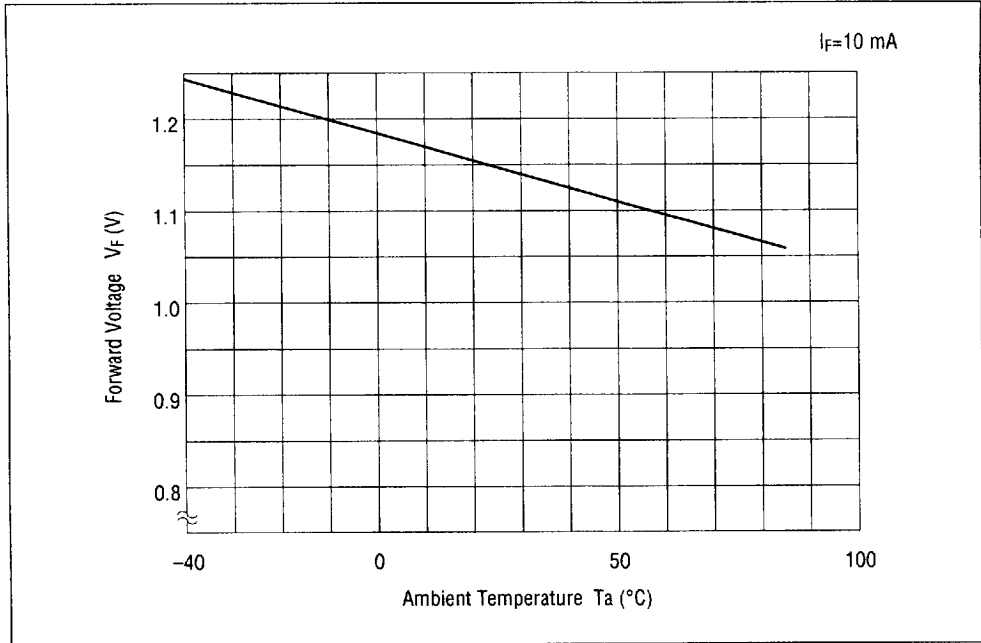
• Forward Current Derating Curve



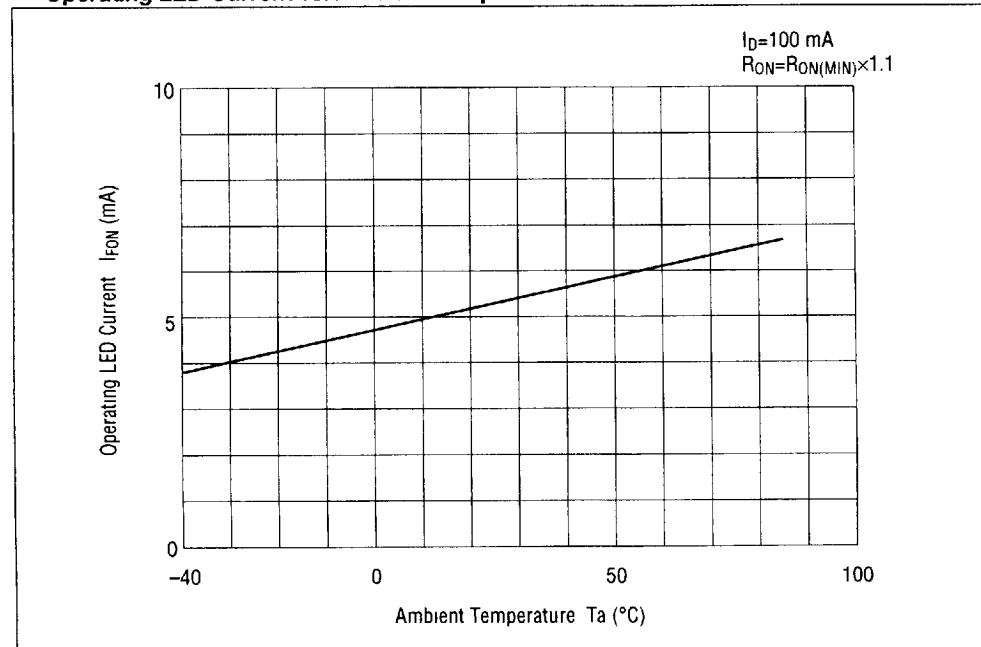
• Continuous Load Current Derating Curve



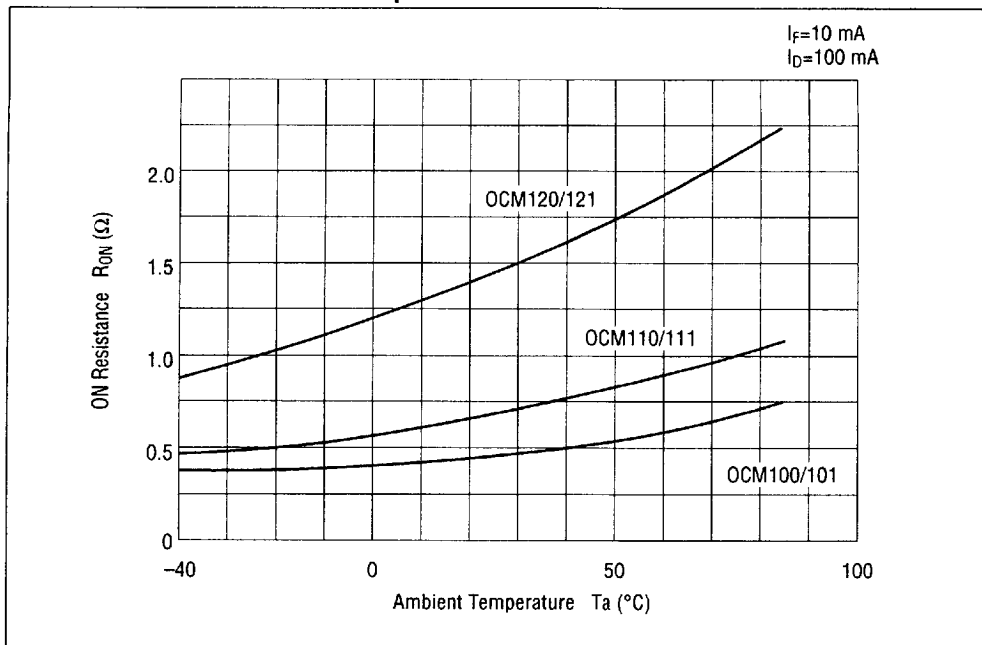
• Forward Voltage vs. Ambient Temperature



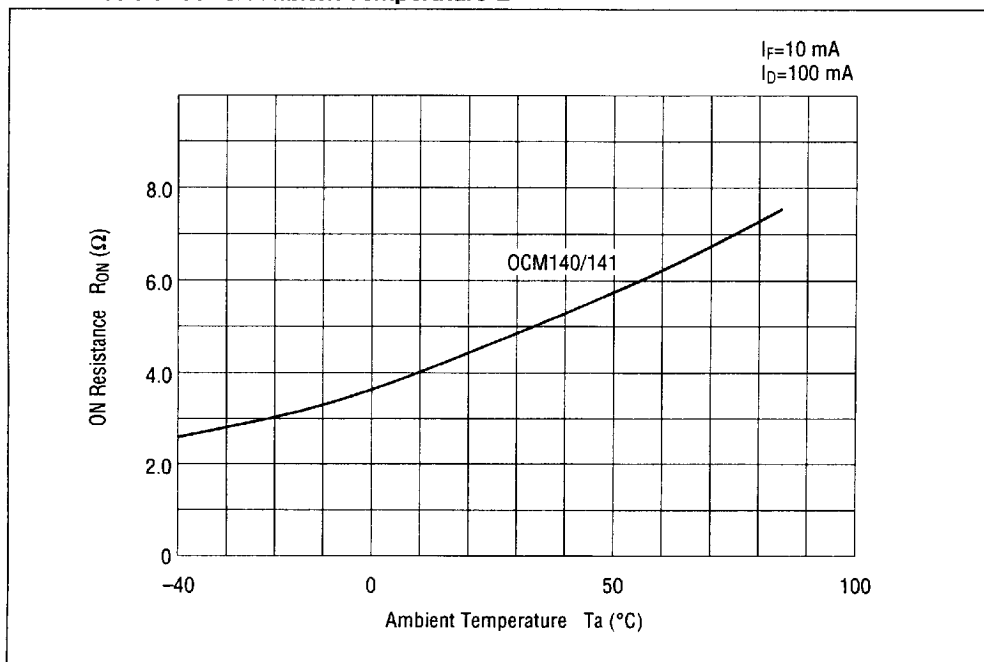
• Operating LED Current vs. Ambient Temperature



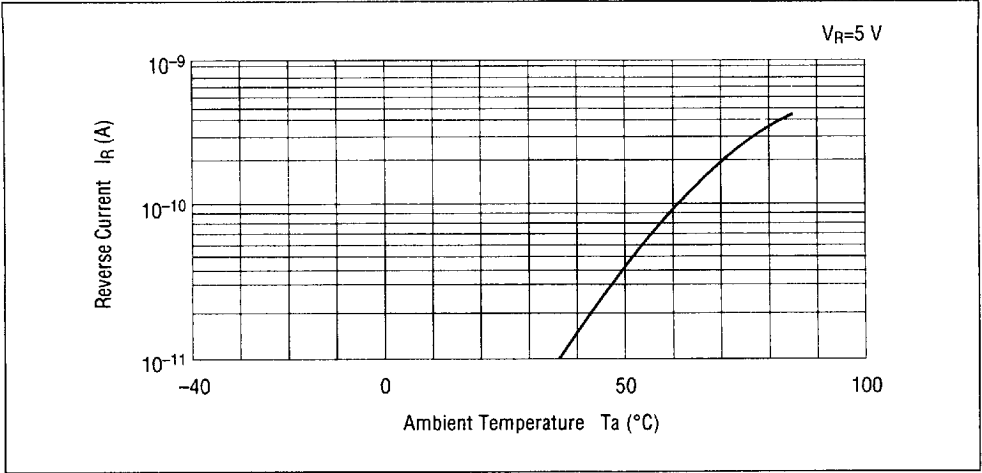
• ON Resistance vs. Ambient Temperature-1



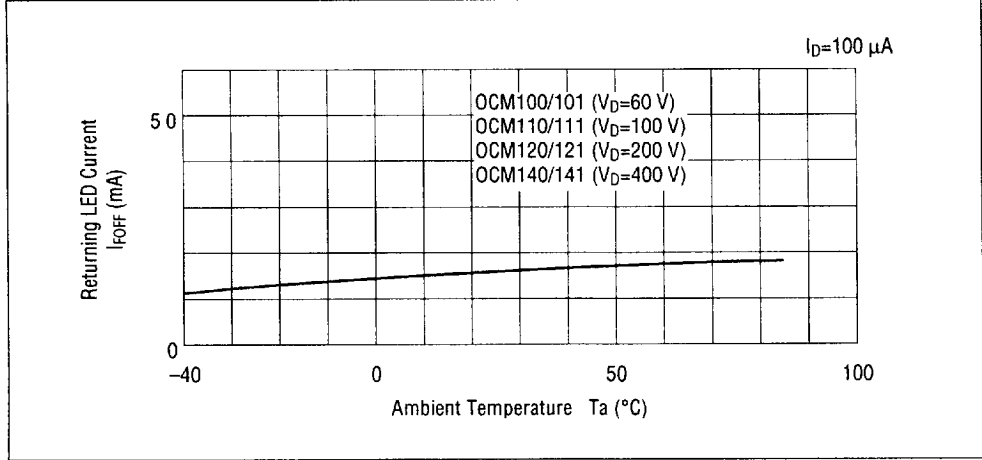
• ON Resistance vs. Ambient Temperature-2



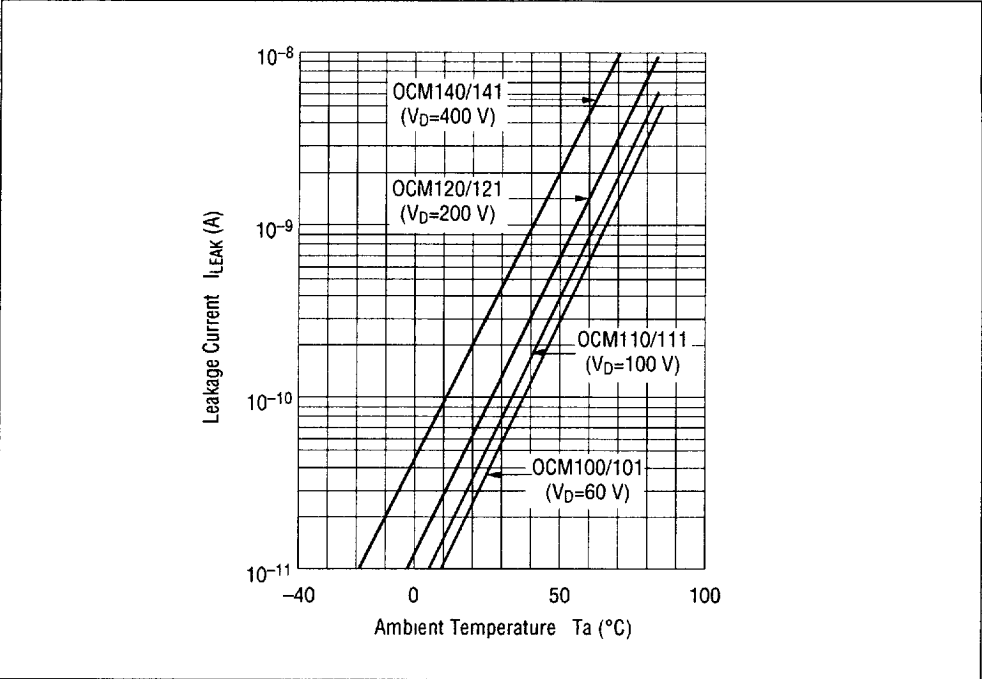
• Reverse Current vs. Ambient Temperature-1



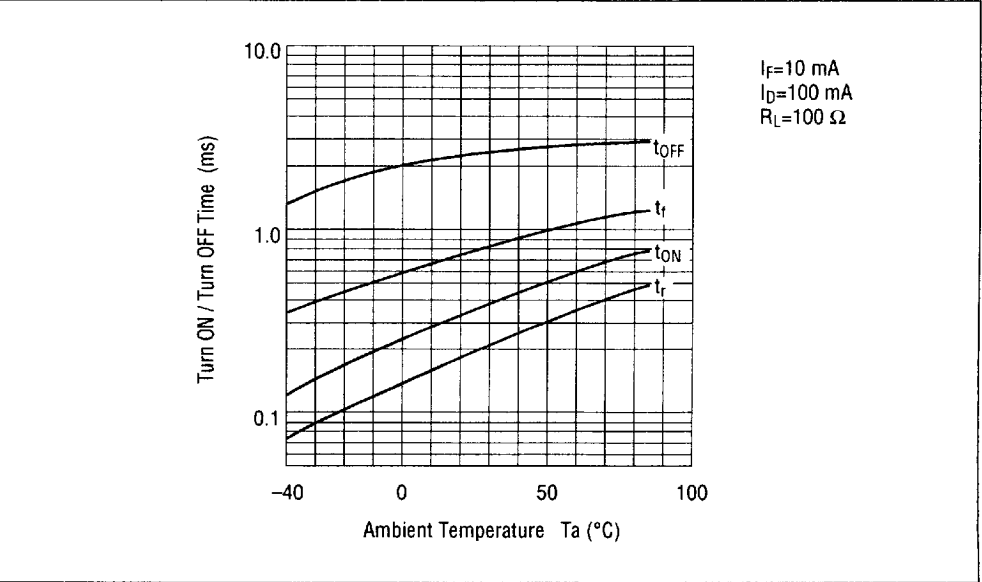
• Returning LED Current vs. Ambient Temperature



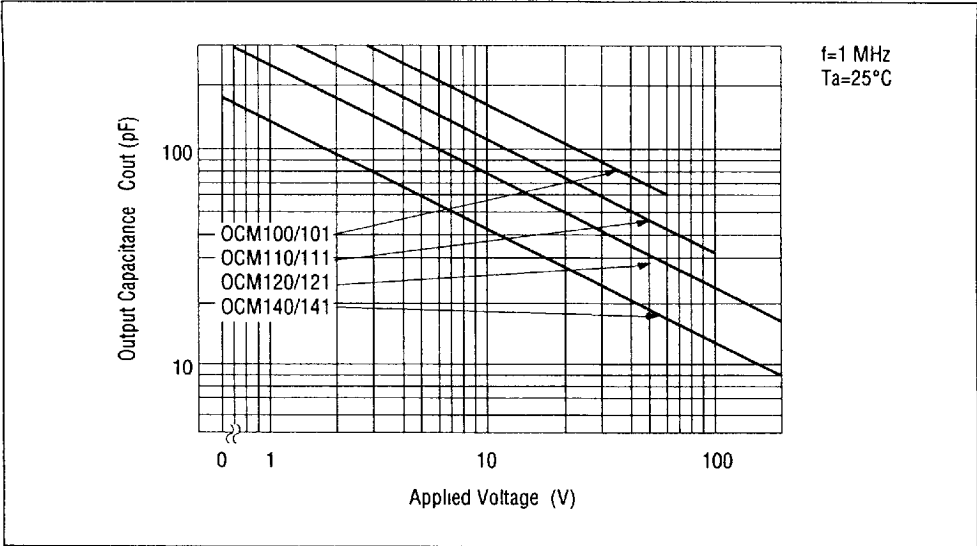
• Leakage Current vs. Ambient Temperature



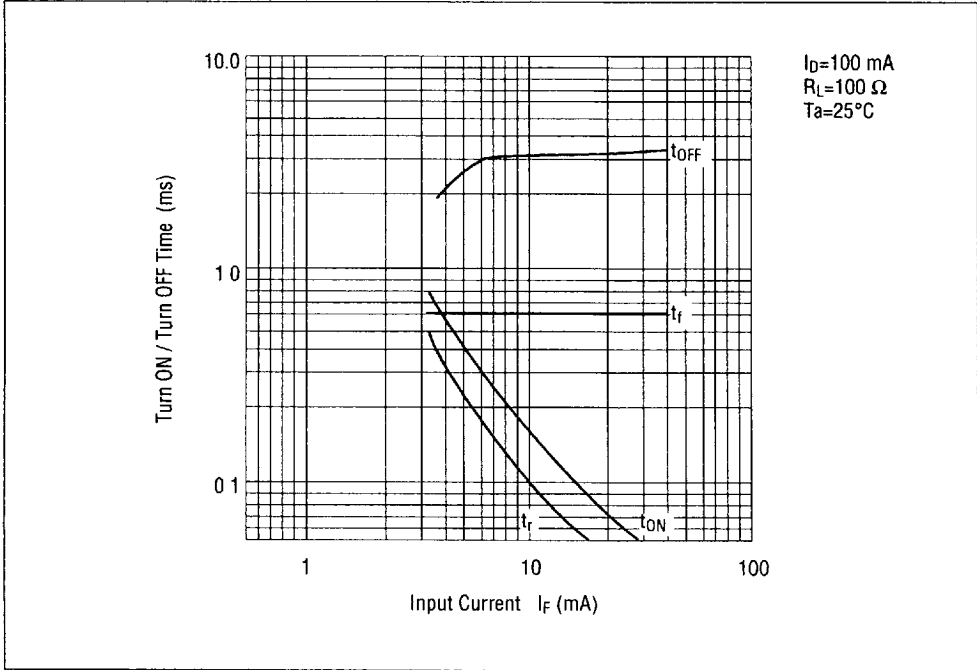
• Turn ON / Turn OFF Time vs. Ambient Temperature



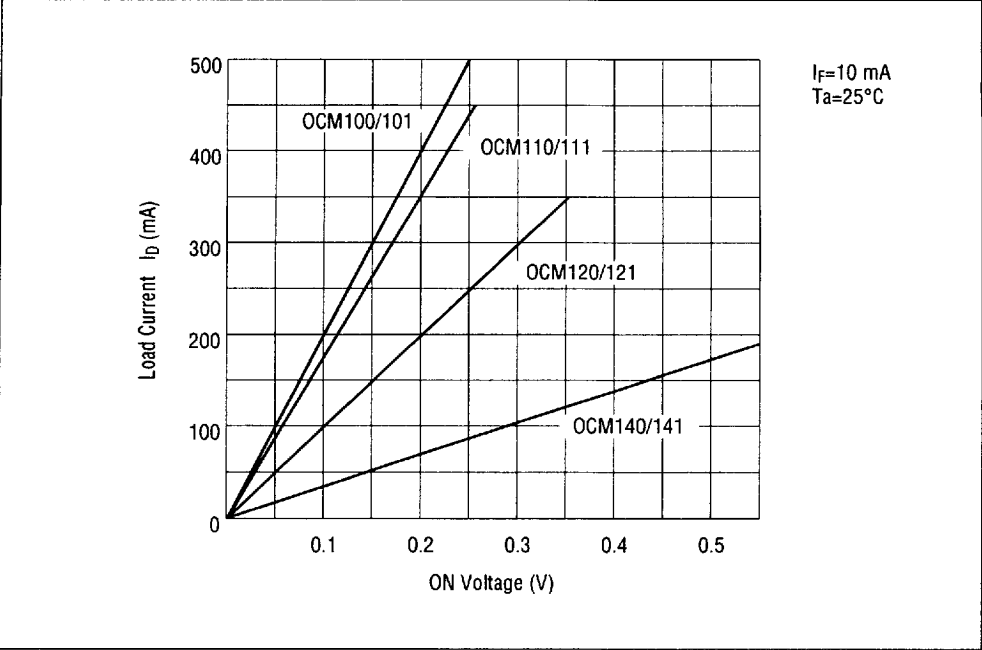
• Output Capacitance vs. Applied Voltage



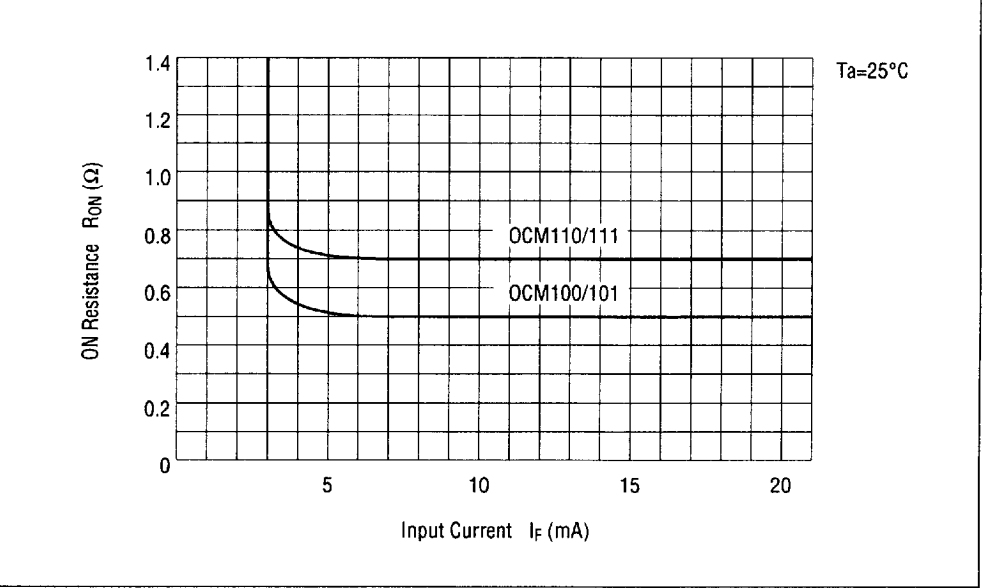
• Turn ON / Turn OFF Time vs. Input Current



• Load Current vs. Voltage

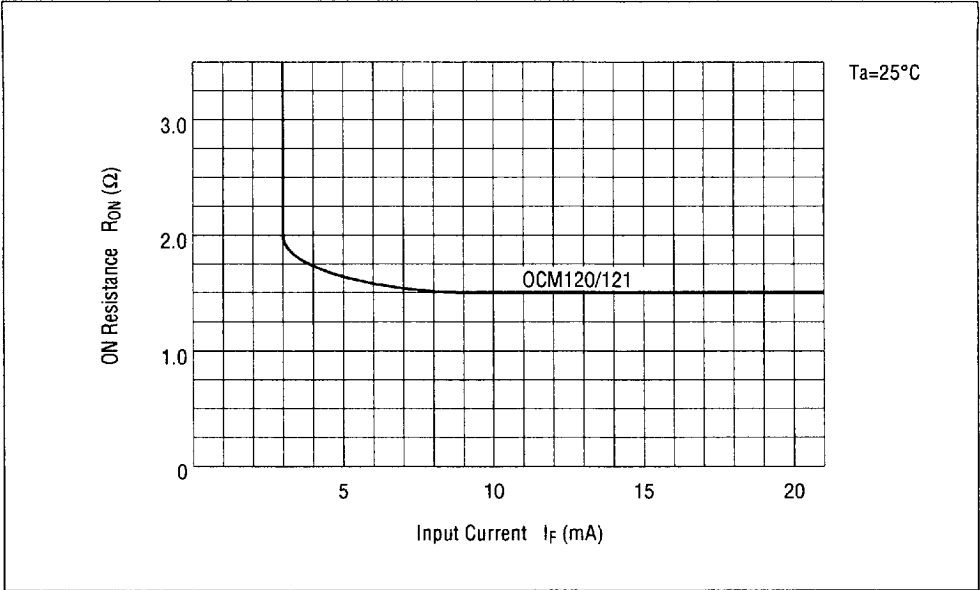


• ON Resistance vs. Input Current-1

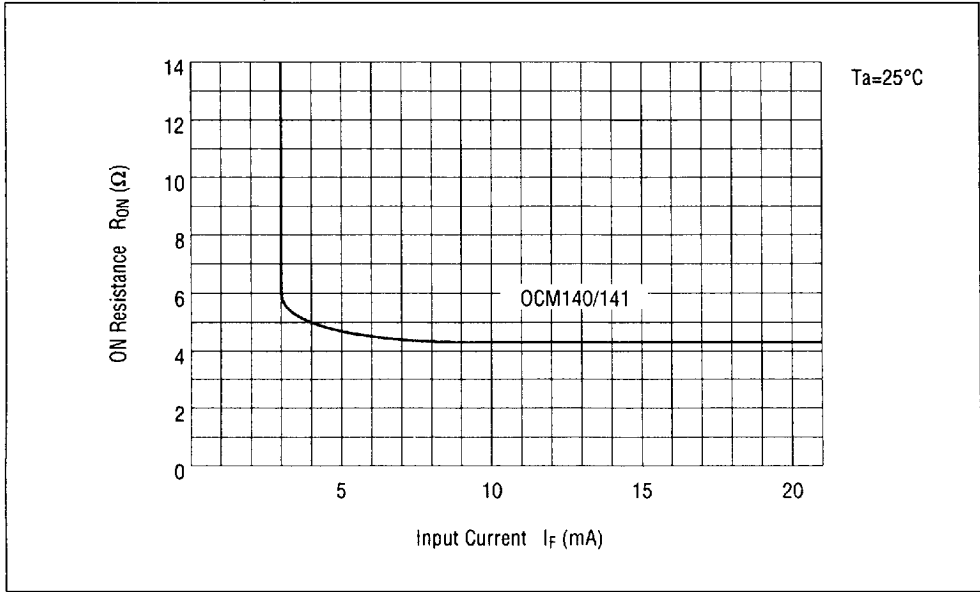


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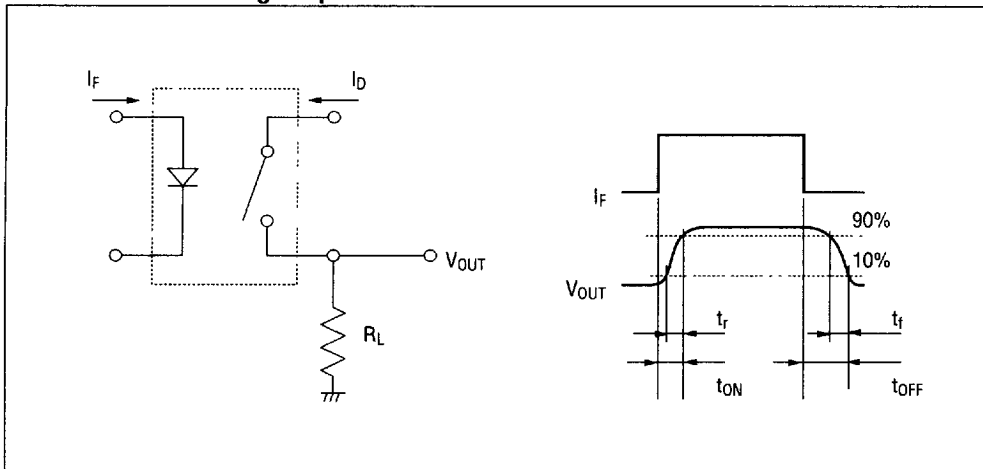
• ON Resistance vs. Input Current-2



• ON Resistance vs. Input Current-3



- **Circuit for Measuring Response Characteristics**



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