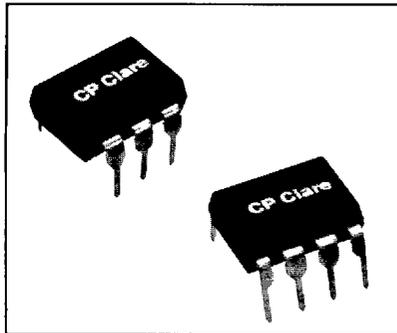


OptoMOS[™] Solid State Switches



DESCRIPTION

Single or dual output OptoMOS solid state switches are part of CP Clare's growing family of solid state switching devices (Loads up to 400 volts AC or DC and currents up to 1 Amp). As replacements for form "A"/"B"/"C" or dual form "A"/"B" electromechanical relays, these devices use a proprietary photovoltaic circuit and MOSFET switching elements for reliable bounce-free switching operation. Complimentary output devices require no auxiliary supply current to maintain an on-state condition.

FEATURES

- Small 6 and 8 pin DIP Packages
- 2mW Drive Power (Logic Compatible)
- No Moving Parts
- Loads up to 400V AC/DC and 1 Amp (1P) or 170mA (2P)
- Expected Life > 15 Billion Operations
- Arc-Free with No Snubbing Circuits
- 3750V_{RMS} Input/Output Isolation
- FCC Compatible
- No EMI/RFI Generation
- Machine Insertable, Wave Solderable
- Surface Mount, Flatpack and Tape & Reel Version Available
- UL Recognized: File Number E76270
- CSA, VDE Compatible
- BAPT: Certified to BS415:1990- Certificate Numbers 7023 and 7726
- BAPT: Certified to BS EN60950: 1992 (BS7002: 1992) Certificate Numbers 7344 and 7727
- BAPT: Complies with EN41003: 1993

APPLICATIONS

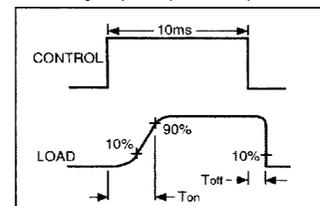
- Telecommunications
 - Telecom Switching
 - Tip/Ring Circuits
 - Modem Switching (Laptop, Notebook, Pocket Size)
 - Hookswitch
 - Dial Pulsing
 - Ground Start
 - Ringer Injection
- Instrumentation
 - Multiplexers
 - Data Acquisition
 - Electronic Switching
 - I/O Subsystems
 - Meters (Watt-Hour, Water, Gas)
 - Medical Equipment
- Security
- Aerospace
- Industrial Controls

RATINGS (@ 25°C)

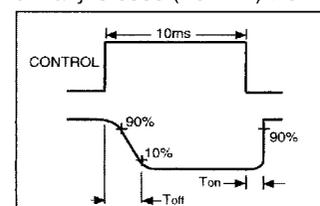
Parameter	Min	Typ	Max	Units
Input Power Dissipation	—	—	150 ¹	mW
Input Control Current	—	—	100	mA
Peak (10msec)	—	—	1	A
Reverse Input Voltage	—	—	5	V
Total Power Dissipation	—	—	800 ²	mW
Capacitance				
Input to Output	—	3	—	pF
Isolation Voltage				
Input to Output	2500	—	—	V _{RMS}
"E" Suffix (Optional)	3750	—	—	V _{RMS}
Operating Temperature	-40	—	85	°C
Storage Temperature	-40	—	125	°C
Soldering Temperature (10 Seconds Max)	—	—	260	°C

¹ Derate Linearly 1.33 mW/°C
² Derate Linearly 6.67 mW/°C

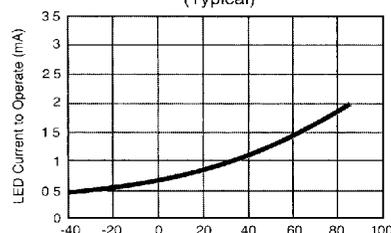
Switching Characteristics of Normally Open (Form A) Devices



Switching Characteristics of Normally Closed (Form B) Devices



LED Operate Current vs Ambient Temperature Characteristics (Typical)



■ 2144904 0000301 567 ■

OptoMOS[™] Solid State Switches

1 Form A Relays

Specifications

Output Characteristics @ 25°C

Part Number	PLA110	PLA140	PLA150	LCA110	LCA120	LCA125	LCA127	LCA710	OMA160	Units
Contact Form	1 Form A									
Load Voltage (Peak)	400	400	250	350	250	300	250	60	250	V
Load Current (Continuous)										
X-Configuration	150	250	170	120	170	170	170	1000	50	mA
Y-Configuration	210	350	300	200	300	300	300	1800	80	
Peak Load Current (10ms Max.)	400	500	500	350	400	400	400	5000	100	mA
On-Resistance @ Rated Load Current										
X-Configuration										Ω
Typ	15	6	5	23	12	10	8	0.3	50	
Max	22	8	7	35	20	16	10	0.5	100	
Y-Configuration										
Typ	5	2	1	7	4	4	2	0.1	15	
Max	7	3	2	10	6	5	3	0.15	30	
Off State Leakage Current @ Rated Load Voltage										
Max	1	1	1	1	1	1	1	1	0.025	μA
Switching Times										
Control Current	5	5	5	2/5	5	5	5	10	10	mA
T _{ON}										
Typ	0.4	0.6	0.8	1.2/1	1.2	1.2	3	1	0.085	ms
Max	1	1.5	2.5	5/3	5	5	5	2.5	0.125	
T _{OFF}										
Typ	0.1	0.1	0.1	1/1	1	1	2	0.06	0.050	ms
Max	0.25	0.25	0.25	3/3	5	5	5	0.25	0.125	
Output Capacitance @ 50V, f = 1MHz										
Typ	35	110	110	25	50	50	110	220	5	pF

Input Characteristics @ 25°C

Input Control Current										
I _{LED}										
Min	5	5	5	2	5	5	5	10	10	mA
Max	100	100	100	100	100	100	100	100	100	
Input Dropout Current										
I _{LED}										
Min	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	mA
Typ	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	
Input Voltage Drop										
V _F @ 5mA										
Min	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	V
Typ	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	
Max	1.4	1.4	1.4	1.4	1.4	1.4	1.4	1.4	1.4	
Reverse Input Voltage										
Max	5	5	5	5	5	5	5	5	5	V
Reverse Input Current										
Max	10	10	10	10	10	10	10	10	10	μA

Input to Output Capacitance										
Typ	3	3	3	3	3	3	3	3	3	pF
Input to Output Isolation										
With "E" Suffix (optional)	2500	2500	2500	2500	2500	2500	2500	2500	2500	V _{RMS}
	3750	3750	3750	3750	3750	3750	3750	3750	3750	
Current Limiting ¹ Version Available	Yes	No	No							

¹Current limiting typically adds 5 ohms to the total on-resistance of the device.

OptoMOS Solid State Switches

1 Form B Relays

Specifications

Output Characteristics @ 25°C

Part Number	LCB110	LCB120	LCB127	Units
Contact Form	1 Form B	1 Form B	1 Form B	
Load Voltage (Peak)	350	250	250	V
Load Current (Continuous)				
X-Configuration	120	170	170	mA
Y-Configuration	200	300	300	
Peak Load Current (10ms Max.)	350	400	400	mA
On-Resistance @ Rated Load Current				Ω
X-Configuration				
Typ	23	16	8	
Max	35	20	10	
Y-Configuration				
Typ	7	5	2	
Max	10	6	3	
Off State Leakage Current @ Rated Load Voltage				μA
Max	1	1	1	
Switching Times				
Control Current	5	5	5	mA
T _{ON}				ms
Typ	0.5	1	2	
Max	3	5	5	
T _{OFF}				ms
Typ	0.7	1.2	3	
Max	3	5	5	
Output Capacitance @ 50V, f = 1MHz				pF
Typ	25	50	100	

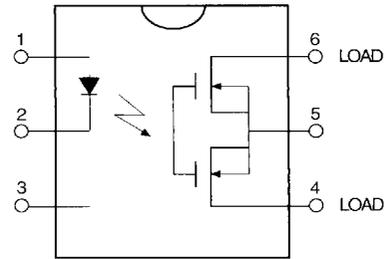
Input Characteristics @ 25°C

Input Control Current					
I _{LED}	Min	5	5	5	mA
I _{LED}	Max	100	100	100	
Input Dropout Current					
I _{LED}	Min	0.4	0.4	0.4	mA
I _{LED}	Typ	0.7	0.7	0.7	
Input Voltage Drop					
V _F @ 5mA	Min	0.9	0.9	0.9	V
V _F @ 5mA	Typ	1.2	1.2	1.2	
V _F @ 5mA	Max	1.4	1.4	1.4	
Reverse Input Voltage	Max	5	5	5	V
Reverse Input Current	Max	10	10	10	μA

Input to Output Capacitance				
Typ	3	3	3	pF
Input to Output Isolation				V _{RMS}
With "E" Suffix (optional)	2500	2500	2500	
With "E" Suffix (optional)	3750	3750	3750	
Current Limiting ¹ Version Available	No	No	No	

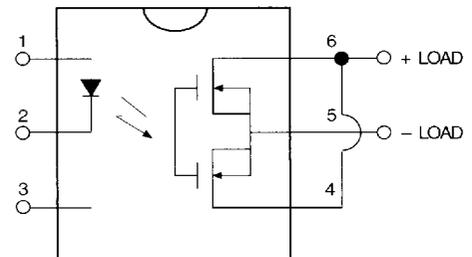
¹Current limiting typically adds 5 ohms to the total on-resistance of the device

X-Configuration
(AC or DC Configuration)



Pin Connections
 1 + Control 6 Load
 2 - Control 5 Do not use
 3 Do not use 4 Load

Y-Configuration
(DC Only Configuration)



Pin Connections
 1 + Control 4 and 6 + Load
 2 - Control 5 - Load
 3 Do not use

NOTE:
For Mechanical Dimensions refer to page 20.

OptoMOS Solid State Switches

2 Form A Relays

Specifications

Output Characteristics @ 25°C

Part Number	PAA110 ³	PAA140 ³	PAA150 ³	LAA110 ³	LAA120 ³	LAA125 ³	LAA127 ³	OAA160 ³	Units
Contact Form	2 Form A								
Load Voltage (Peak)	400	400	250	350	250	300	250	250	V

OptoMOS Solid State Switches

2 Form B / 1 Form B - 1 Form A / 1 Form C Relays

Specifications

Output Characteristics @ 25°C

Part Number	LBB110 ²	LBB120 ²	LBB127 ²	LBA110 ²	LBA120 ²	LBA127	LCC110	LCC120	Units	
Contact Form	2 Form B	2 Form B	2 Form B	1 Form B 1 Form A	1 Form B 1 Form A	1 Form B 1 Form A	1 Form C	1 Form C		
Load Voltage (Peak)	350	250	250	350	250	250	350	250	V	
Load Current (Continuous)	120	170	170	120	170	170	120	170	mA	
Peak Load Current (10ms Max.)	350	400	400	350	400	400	350	400	mA	
On-Resistance @ Rated Load Current										
	Typ Max	23 35	16 20	8 10	23 35	16 20	8 10	23 35	16 20	Ω
Off State Leakage Current @ Rated Load Voltage	Max	1	1	1	1	1	1	1	1	μA
Switching Times										
Control Current		5	5	5	5	5	8	10	mA	
T _{ON}	Typ Max	0.5 3	1 5	2 5	— 3	— 5	— 4	— 5	— 5	ms
T _{OFF}	Typ Max	0.7 3	1.2 5	3 5	— 3	— 5	— 4	— 5	— 5	ms
Output Capacitance @ 50V, f = 1MHz	Typ	25	50	110	25	50	110	25	50	pF

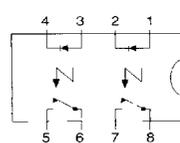
Input Characteristics @ 25°C

Input Control Current I _{LED}	Min Max	5 100	5 100	5 100	5 100	5 100	5 100	8 100	10 100	mA
Input Dropout Current I _{LED}	Min Typ	0.4 0.7	mA							
Input Voltage Drop V _F @ 5mA	Min Typ Max	0.9 1.2 1.4	V							
Reverse Input Voltage	Max	5	5	5	5	5	5	5	5	V
Reverse Input Current	Max	10	10	10	10	10	10	10	10	μA

Input to Output Capacitance	Typ	3	3	3	3	3	3	3	3	pF
Input to Output Isolation With "E" Suffix (optional)		2500 3750	V _{RMS}							
Current Limiting ¹ Version Available		No	No	No	No Yes	No Yes	No Yes	No	No	

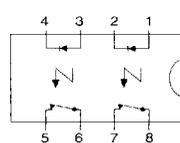
¹ See page 6
² Available in low profile flatpack

PA/LAA/OAA



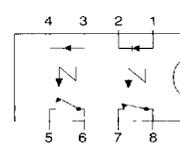
CONNECTIONS
1,2 Control, Pole 1
3,4 Control, Pole 2
5,6 Normally-Open Pole 2
7,8 Normally-Open Pole 1

LBB



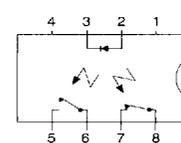
CONNECTIONS
1,2 Control, Pole 1
3,4 Control, Pole 2
5,6 Normally-Closed Pole 2
7,8 Normally Closed Pole 1

LBA



CONNECTIONS
1,2 Normally-Closed Control
3,4 Normally-Open Control
5,6 Normally-Open Pole
7,8 Normally-Closed Pole

LCC

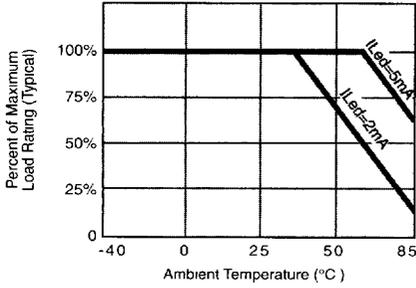


CONNECTIONS
1 Do not Use
2+ + Control
3 - Control
4 Do not Use
5,6 Normally-Open Pole
7,8 Normally Closed Pole

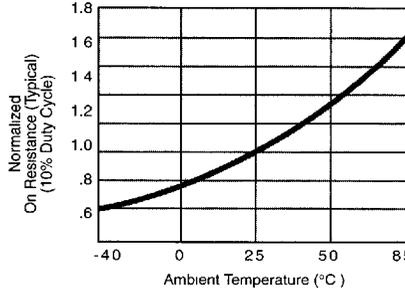
2144904 0000305 102

OptoMOS[®] Performance Data

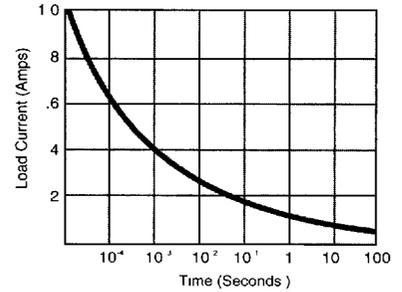
1) Load Current vs Ambient Temperature Characteristics



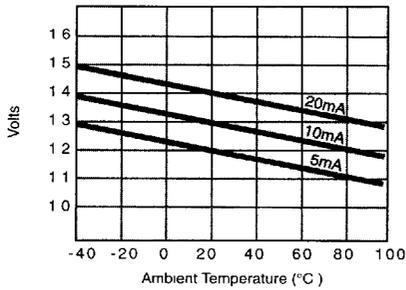
2) Normalized On-Resistance vs. Ambient Temperature



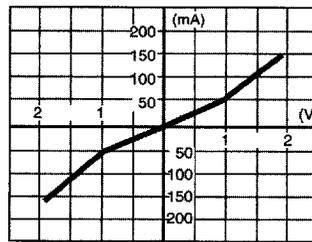
3) Energy Rating Curve
Load Current vs Time



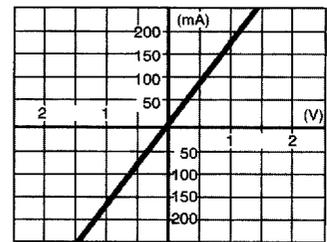
4) Typical Forward Voltage vs Temperature (VF)



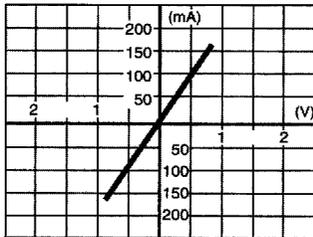
5) PLA110, PAA110
Load Voltage vs. Load Current Characteristics (Typical)



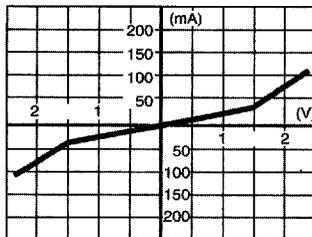
6) PLA140, PAA140
Load Voltage vs. Load Current Characteristics (Typical)



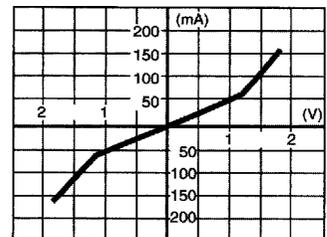
7) PLA150, PAA150
Load Voltage vs. Load Current Characteristics (Typical)



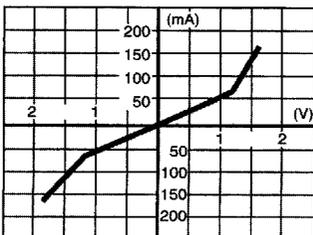
8) LCA110, LAA110, LCB110
LBB110, LBA110, LCC110
Load Voltage vs. Load Current Characteristics (Typical)



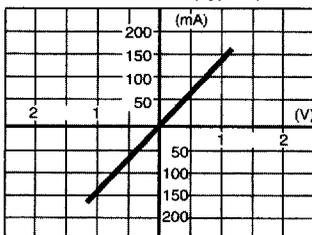
9) LCA120, LAA120, LCB120
LBB120, LBA120, LCC120
Load Voltage vs. Load Current Characteristics (Typical)



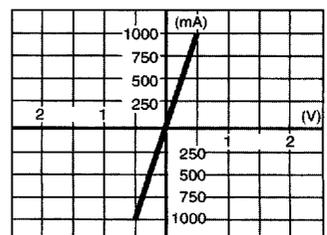
10) LCA125, LAA125
Load Voltage vs. Load Current Characteristics (Typical)



11) LCA127, LAA127, LCB127
LBB127, LBA127
Load Voltage vs. Load Current Characteristics (Typical)

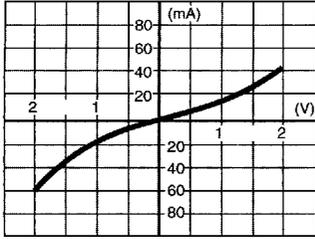


12) LCA710
Load Voltage vs. Load Current Characteristics (Typical)

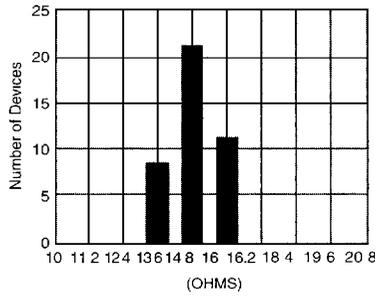


OptoMOS Performance Data

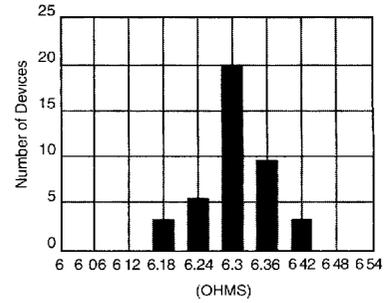
13) OMA160, OAA160
Load Voltage vs. Load Current
Characteristics (Typical)



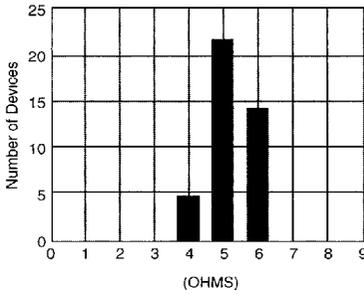
14) PLA110, PAA110
On-Resistance Distribution
(N=40: Ambient Temp = 25 Deg C)



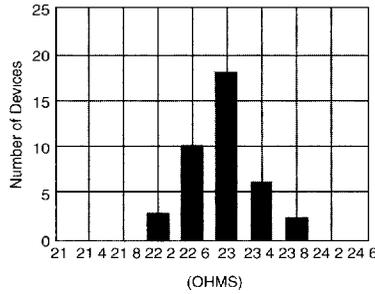
15) PLA140, PAA140
On-Resistance Distribution
(N=40: Ambient Temp = 25 Deg C)



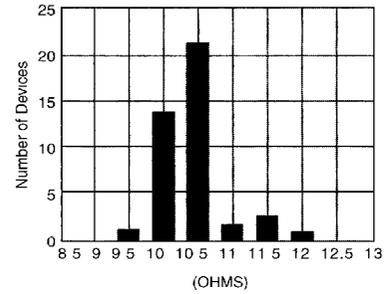
16) PLA150, PAA150
On-Resistance Distribution
(N=40: Ambient Temp = 25 Deg C)



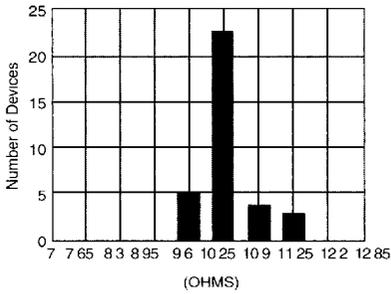
17) LCA110, LAA110, LCB110,
LBB110, LCC110
On-Resistance Distribution
(N=40: Ambient Temp = 25 Deg C)



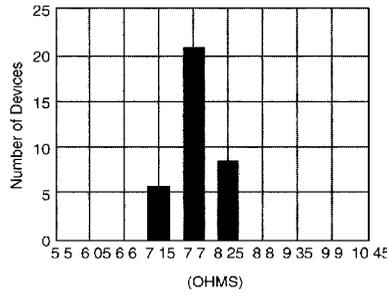
18) LCA120, LAA120, LCB120,
LBB120, LCC120
On-Resistance Distribution
(N=40: Ambient Temp = 25 Deg C)



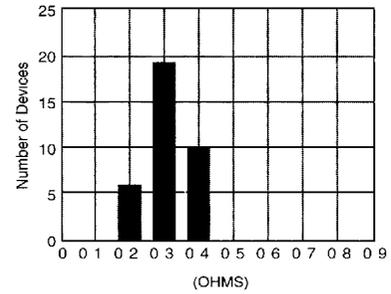
19) LCA125, LAA125
On-Resistance Distribution
(N=40: Ambient Temp = 25 Deg C)



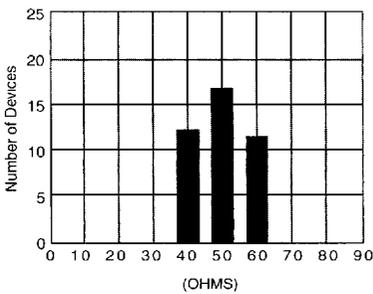
20) LCA127, LAA127, LCB127,
LBB127, LBA127
On-Resistance Distribution
(N=40: Ambient Temp = 25 Deg C)



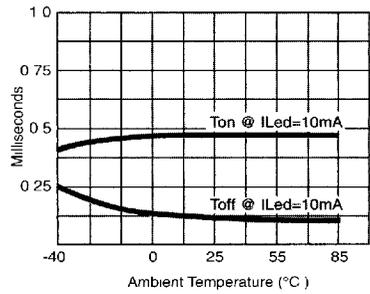
21) LCA710
On-Resistance Distribution
(N=40: Ambient Temp = 25 Deg C)



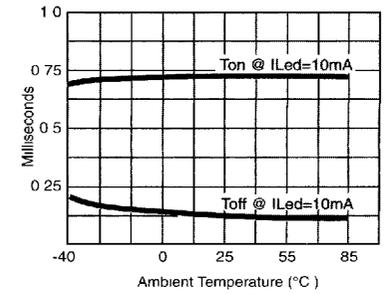
22) OMA160, OAA160
On-Resistance Distribution
(N=40: Ambient Temp = 25 Deg C)



23) PLA110, PAA110
Switching Speed vs Temperature
(Typical)

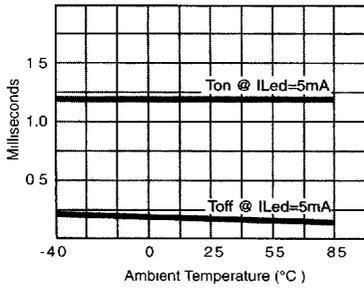


24) PLA140, PAA140
Switching Speed vs Temperature
(Typical)

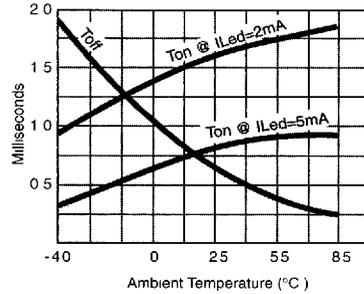


OptoMOS Performance Data

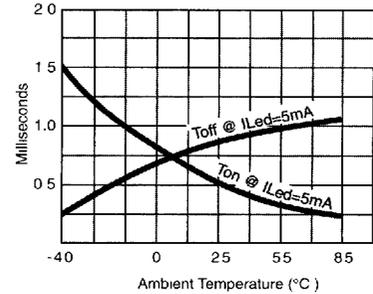
25) **PLA150, PAA150**
Switching Speed vs Temperature
(Typical)



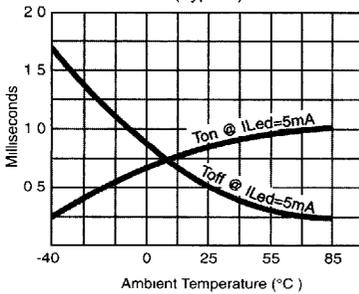
26) **LCA110, LAA110**
Switching Speed vs Temperature
(Typical)



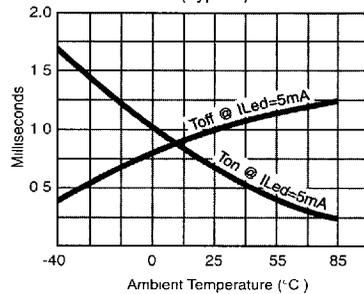
27) **LCB110, LBB110**
Switching Speed vs Temperature
(Typical)



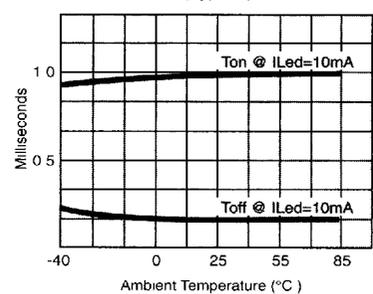
28) **LCA120, LCA125, LCA127**
LAA120, LAA125, LAA127
Switching Speed vs Temperature
(Typical)



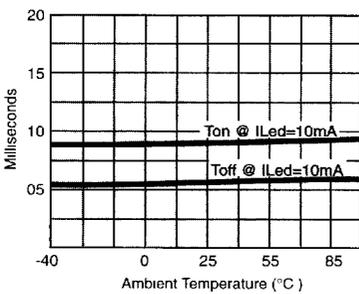
29) **LCB120, LCB127, LBB120,**
LBB127
Switching Speed vs Temperature
(Typical)



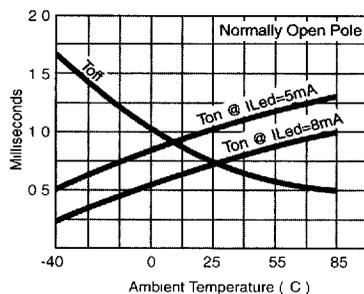
30) **LCA710**
Switching Speed vs Temperature
(Typical)



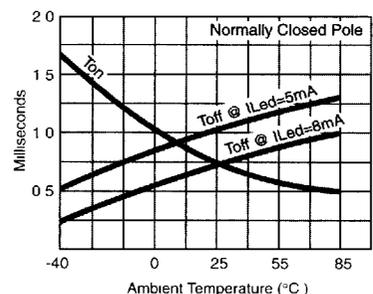
31) **OMA160, OAA160**
Switching Speed vs Temperature
(Typical)



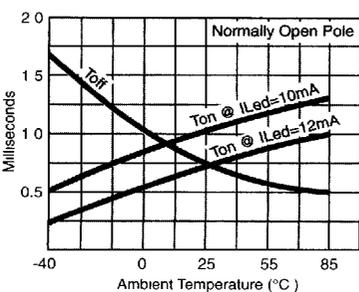
32) **LBA110, LBA120, LBA127**
Switching Speed vs Temperature
(Typical)



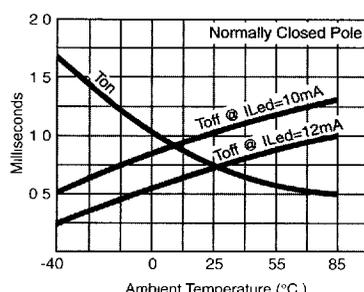
33) **LBA110, LBA120, LBA127**
Switching Speed vs Temperature
(Typical)



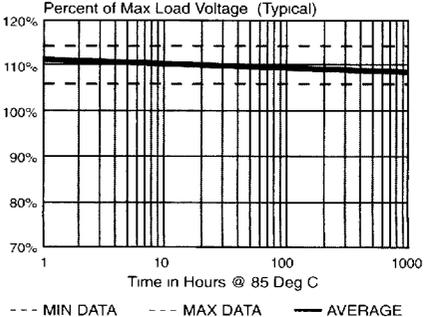
34) **LCC110, LCC120**
Switching Speed vs Temperature
(Typical)



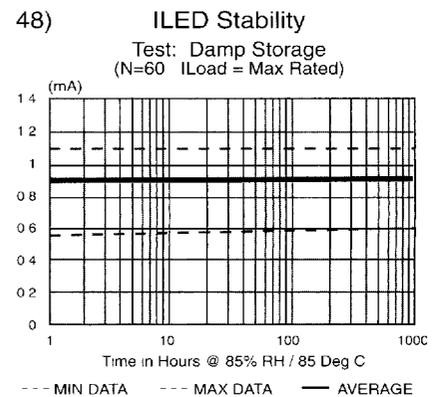
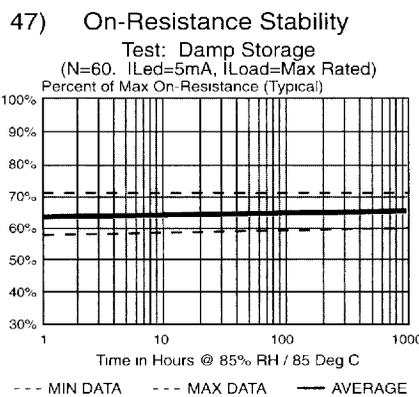
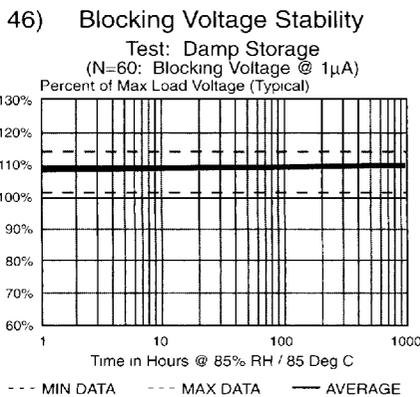
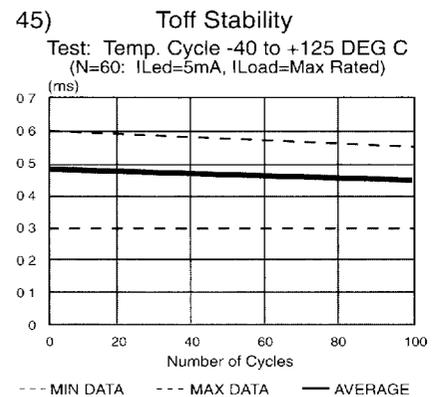
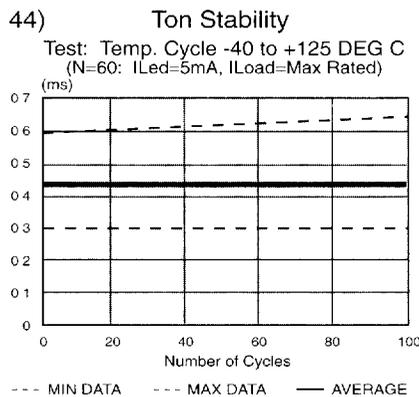
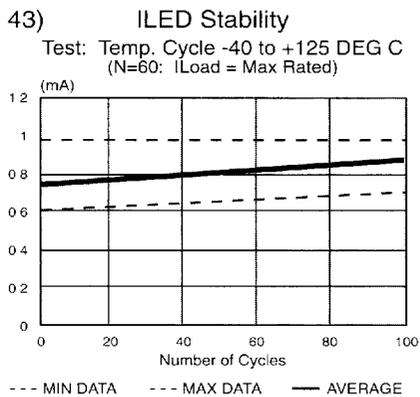
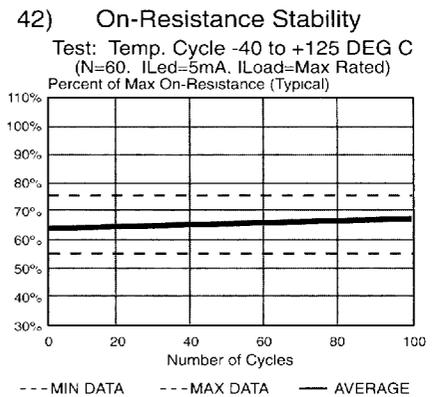
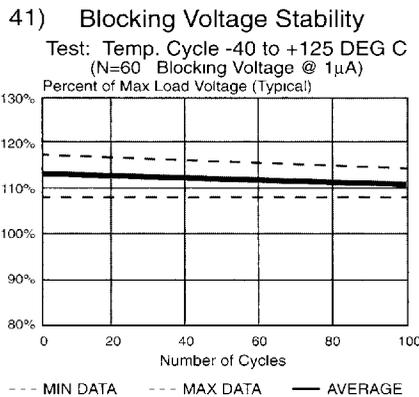
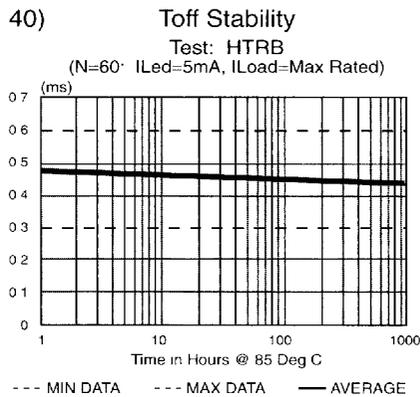
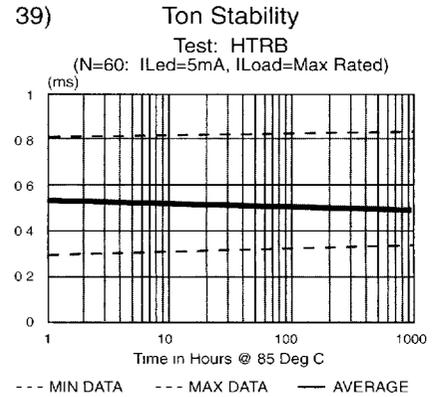
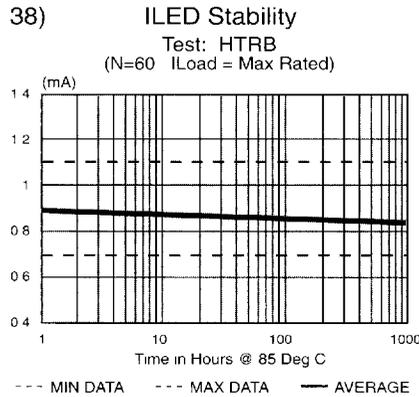
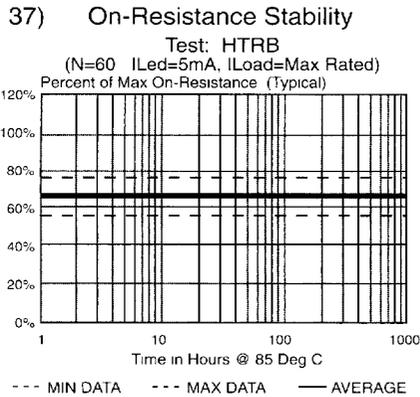
35) **LCC110, LCC120**
Switching Speed vs Temperature
(Typical)



36) **Blocking Voltage Stability**
Test: HTRB
(N=60: Blocking Voltage @ 1μA)



OptoMOS Performance Data



OptoMOS[™] Performance Data

