

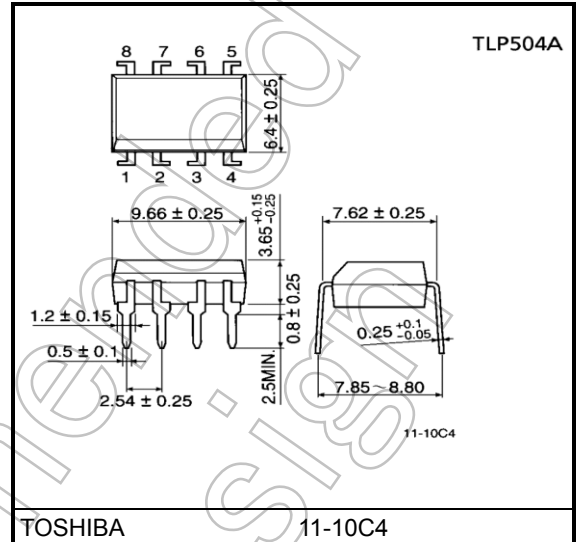
TLP504A, TLP504A-2

Programmable Controllers
AC/DC-Input Module
Solid State Relay

Unit: mm

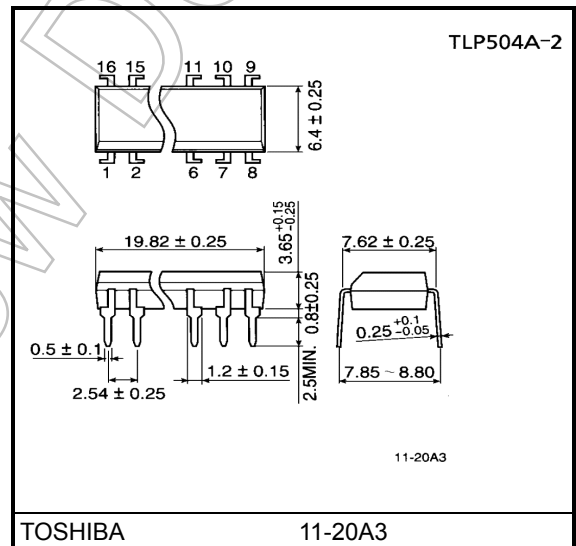
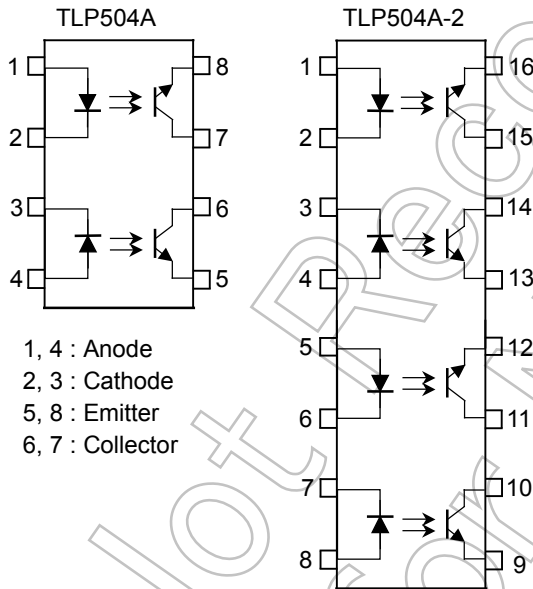
The TOSHIBA TLP504A and TLP504A-2 consists of a photo-transistor optically coupled to an infrared emitting diode. The TLP504A offers two isolated channels in an eight lead plastic DIP package, while the TLP504A-2 provides four isolated channels in a sixteen plastic DIP package.

- Collector-emitter voltage: 55 V (min)
- Current transfer ratio: 50% (min)
Rank GB: 100% (min)
- Isolation voltage: 2500 Vrms (min)
- UL-recognized: UL 1577, File No.E67349



Weight: 0.54 g (typ.)

Pin Configurations (top view)



Weight: 1.1 g (typ.)

Start of commercial production
1981-01

Absolute Maximum Ratings (Ta = 25°C)

Characteristics		Symbol	Rating		Unit
			TLP504A	TLP504A-2	
LED	Forward current	I _F	60	50	mA
	Forward current derating	ΔI _F /°C	-0.7 (Ta ≥ 39°C)	-0.5 (Ta ≥ 25°C)	mA/°C
	Pulse forward current (100μs pulse, 100pps)	I _{FP}	1		A
	Reverse voltage	V _R	5		V
	Diode power dissipation	P _D	100		mW
	Diode power dissipation derating	ΔP _D /°C	-1.2 (Ta ≥ 39°C)	-1.0 (Ta ≥ 25°C)	mW/°C
	Junction temperature	T _j	125		°C
Detector	Collector-emitter voltage	V _{CEO}	55		V
	Emitter-collector voltage	V _{ECO}	7		V
	Collector current	I _C	50		mA
	Collector power dissipation (1 circuit)	P _C	150	100	mW
	Collector power dissipation derating (1 circuit) (Ta ≥ 25°C)	ΔP _C /°C	-1.5	-1.0	mW/°C
	Junction temperature	T _j	125		°C
Storage temperature range		T _{stg}	-55 to 150		°C
Operating temperature range		T _{opr}	-55 to 100		°C
Lead soldering temperature (10 s)		T _{sol}	260		°C
Total package power dissipation		R _T	250	150	mW
Total package power dissipation derating (Ta ≥ 25°C)		ΔP _T /°C	-2.5	-1.5	mW/°C
Isolation voltage (AC, 60 s, R.H. ≤ 60 %) (Note 1)		BV _S	2500		V _{rms}

Note: Using continuously under heavy loads (e.g. the application of high temperature/current/voltage and the significant change in temperature, etc.) may cause this product to decrease in the reliability significantly even if the operating conditions (i.e. operating temperature/current/voltage, etc.) are within the absolute maximum ratings.

Please design the appropriate reliability upon reviewing the Toshiba Semiconductor Reliability Handbook ("Handling Precautions"/"Derating Concept and Methods") and individual reliability data (i.e. reliability test report and estimated failure rate, etc).

Note 1: Device considered a two terminal device: LED side pins shorted together and detector side pins shorted together.

Recommended Operating Conditions

Characteristics	Symbol	Min.	Typ.	Max.	Unit
Supply voltage	V _{CC}	—	5	24	V
Forward current	I _F	—	16	20	mA
Collector current	I _C	—	1	10	mA
Operating temperature	T _{opr}	-25	—	85	°C

Note: Recommended operating conditions are given as a design guideline to obtain expected performance of the device. Additionally, each item is an independent guideline respectively. In developing designs using this product, please confirm specified characteristics shown in this document.

Electrical Characteristics (Ta = 25°C)

Characteristics		Symbol	Test Condition	Min	Typ.	Max	Unit
LED	Forward voltage	V_F	$I_F = 10 \text{ mA}$	1.0	1.15	1.3	V
	Reverse current	I_R	$V_R = 5 \text{ V}$	—	—	10	μA
	Capacitance	C_T	$V = 0 \text{ V}, f = 1 \text{ MHz}$	—	30	—	pF
Detector	Collector-emitter breakdown voltage	$V_{(BR)CEO}$	$I_C = 0.5 \text{ mA}$	55	—	—	V
	Emitter-collector breakdown voltage	$V_{(BR)ECO}$	$I_E = 0.1 \text{ mA}$	7	—	—	V
	Collector dark current	I_{CEO}	$V_{CE} = 24 \text{ V}$	—	10	100	nA
			$V_{CE} = 24 \text{ V}, T_a = 85 \text{ }^\circ\text{C}$	—	2	50	μA
Capacitance collector to emitter	C_{CE}	$V = 0 \text{ V}, f = 1 \text{ MHz}$	—	10	—	pF	

Coupled Electrical Characteristics (Ta = 25°C)

Characteristics	Symbol	Test Condition	Min	Typ.	Max	Unit	
Current transfer ratio	I_C/I_F	$I_F = 5 \text{ mA}, V_{CE} = 5 \text{ V}$	50	—	600	%	
			Rank GB	100	600		
Saturated CTR	$I_C/I_F(\text{sat})$	$I_F = 1 \text{ mA}, V_{CE} = 0.4 \text{ V}$	—	60	—	%	
			Rank GB	30	—		
Collector-emitter saturation voltage	$V_{CE}(\text{sat})$	$I_C = 2.4 \text{ mA}, I_F = 8 \text{ mA}$	—	—	0.4	V	
			Rank GB	—	0.2		—
				Rank GB	—		—

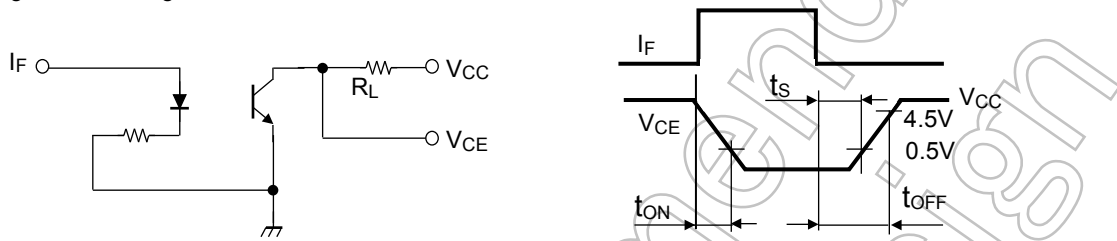
Isolation Characteristics (Ta = 25°C)

Characteristics	Symbol	Test Condition	Min	Typ.	Max	Unit
Capacitance input to output	C_S	$V_S = 0 \text{ V}, f = 1 \text{ MHz}$	—	0.8	—	pF
Isolation resistance	R_S	$V_S = 500 \text{ V}, R.H. \leq 60 \%$	5×10^{10}	10^{14}	—	Ω
Isolation voltage	BV_S	AC, 60 s	2500	—	—	Vrms

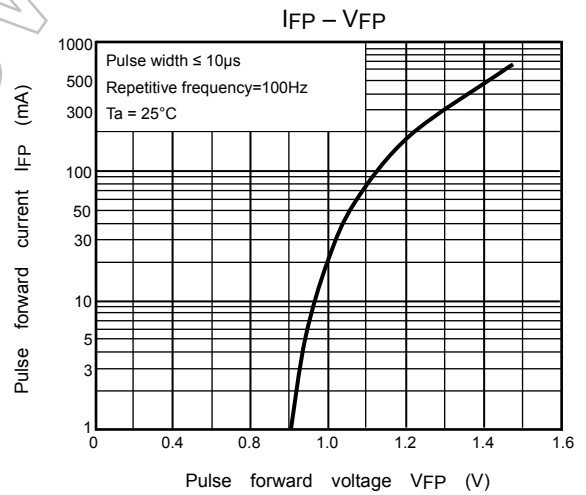
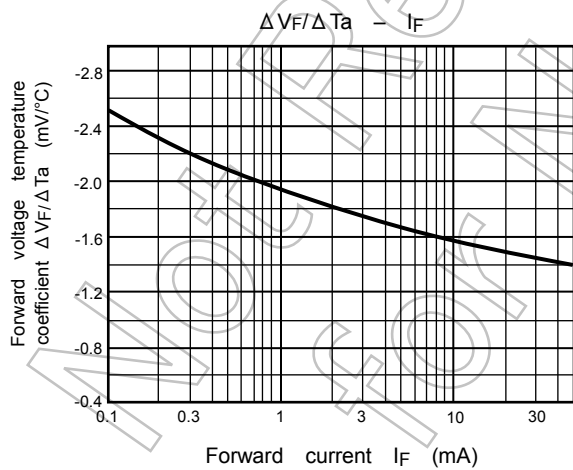
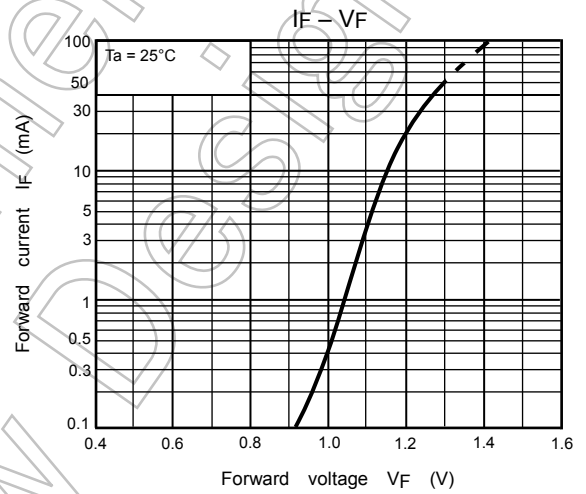
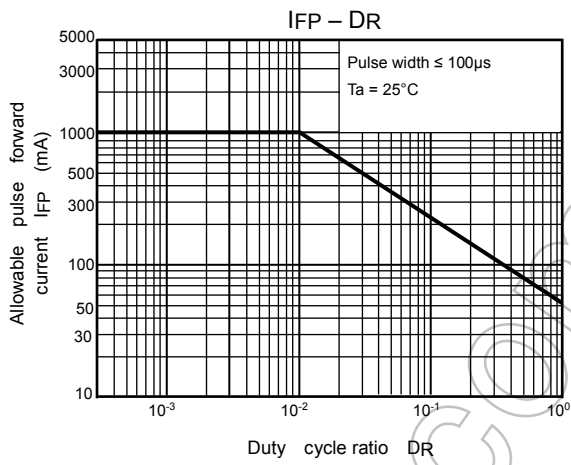
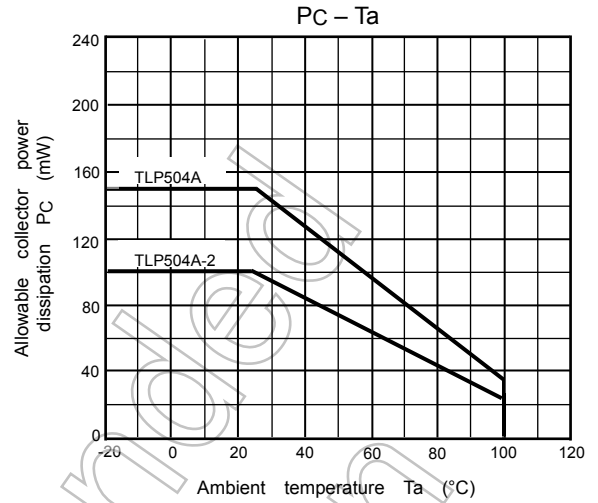
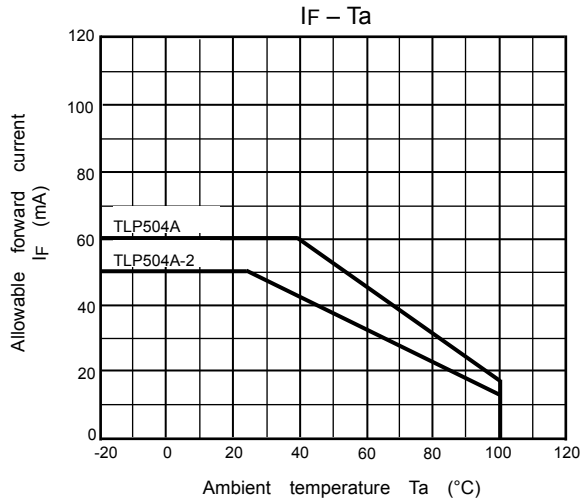
Switching Characteristics (Ta = 25°C)

Characteristic	Symbol	Test Condition	Min	Typ.	Max	Unit
Rise time	t_r	$V_{CC} = 10\text{ V}, I_C = 2\text{ mA}$ $R_L = 100\ \Omega$	—	2	—	μs
Fall time	t_f		—	3	—	
Turn-on time	t_{on}		—	3	—	
Turn-off time	t_{off}		—	3	—	
Turn-on time	t_{ON}	$R_L = 1.9\text{ k}\Omega$ $V_{CC} = 5\text{ V}, I_F = 16\text{ mA}$ (Fig.1)	—	2	—	μs
Storage time	t_s		—	15	—	
Turn-off time	t_{OFF}		—	25	—	

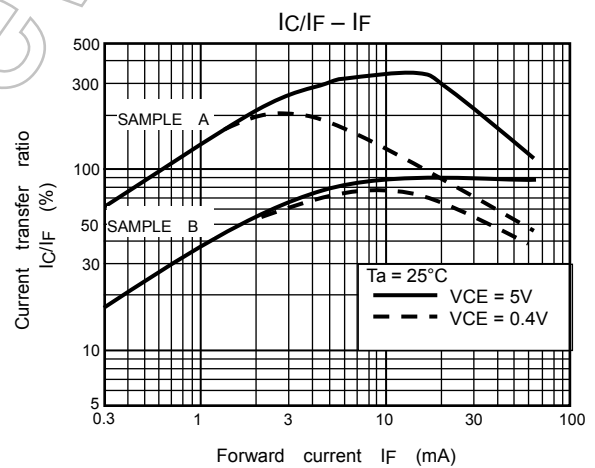
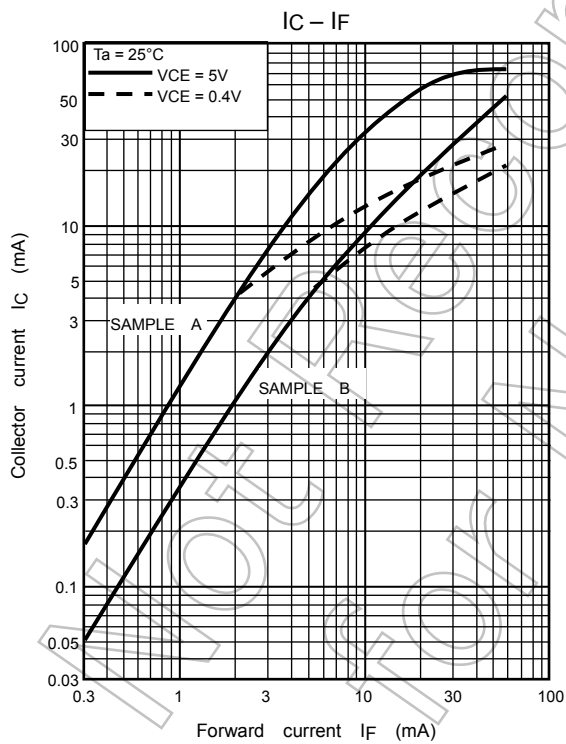
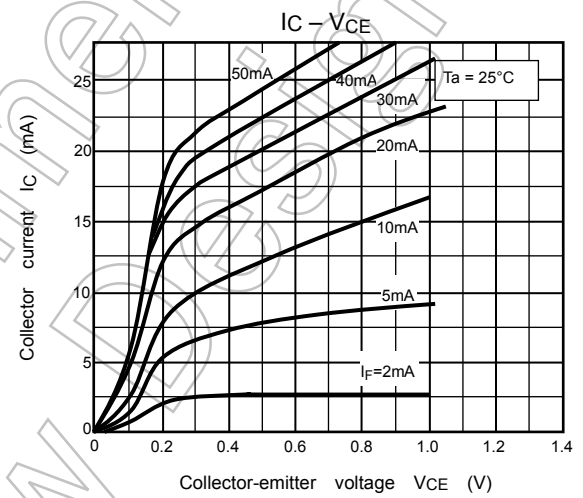
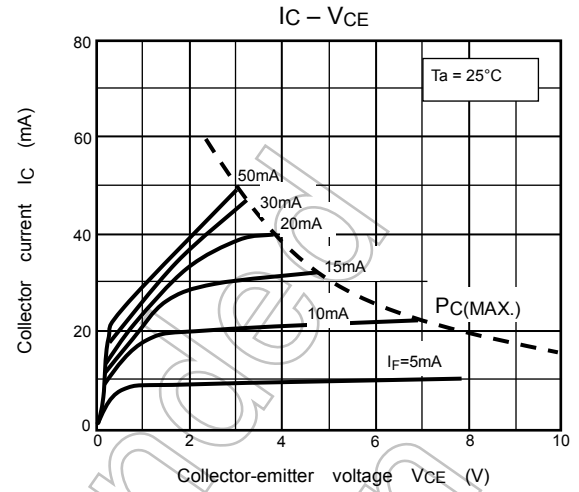
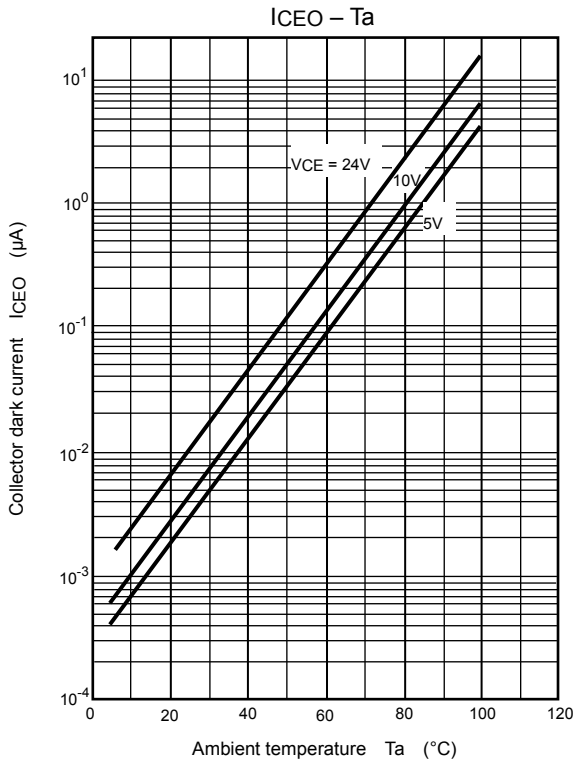
Fig. 1 Switching time test circuit



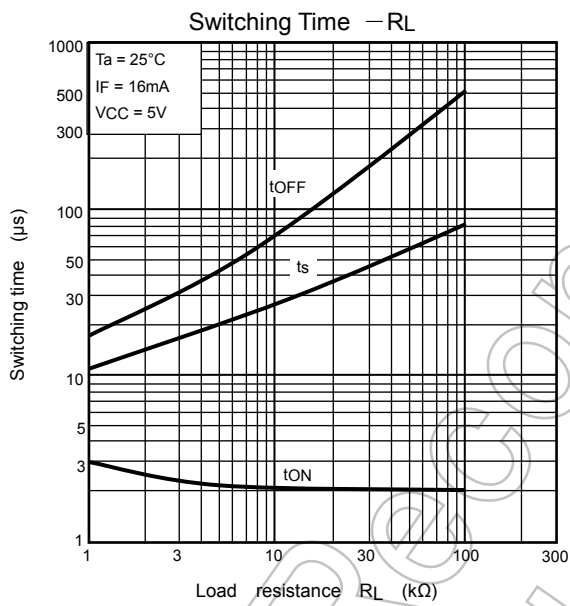
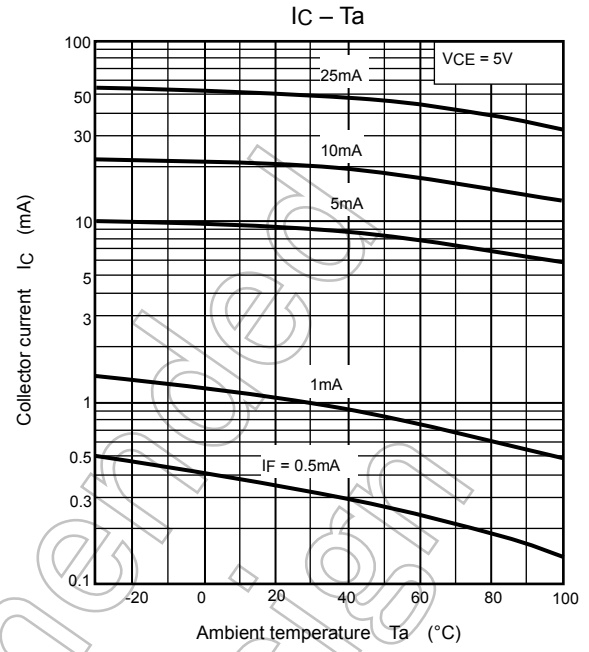
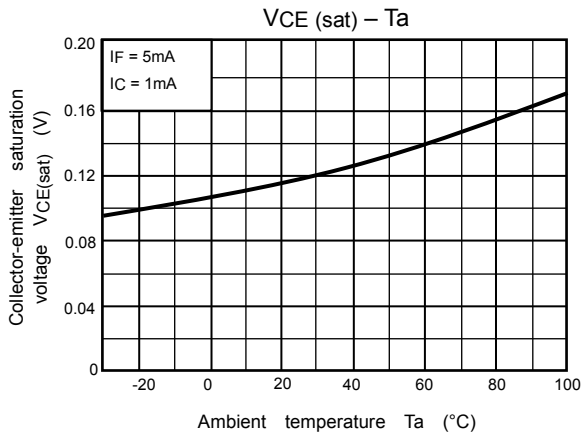
Not Recommended for New Design



NOTE: The above characteristics curves are presented for reference only and not guaranteed by production test, unless otherwise noted.



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