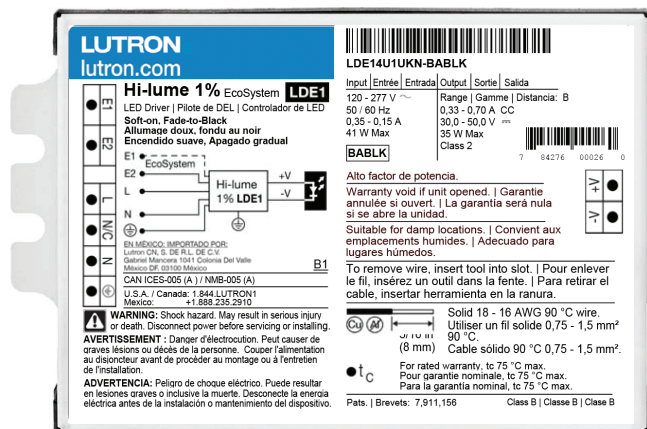


Hi-lume 1% EcoSystem LED Driver with Soft-on, Fade-to-Black

Hi-lume 1% EcoSystem LED Drivers with Soft-on, Fade-to-Black provide a high-performance solution for any space, in any application. They provide smooth, continuous dimming down to 1% of full output current, and fade smoothly between 0% and 1% with Soft-on, Fade-to-Black.

Features

- UL® Listed Class P.
- UL® Type TL rated. Visit “Online Certificates Directory” at www.ul.com, enter file number “E322469” to determine the Type TL numbers specific to the LDEX model Lutron LED Driver.
- Soft-on, Fade-to-Black: fades smoothly between 0% and 1% when turned on and off for an incandescent-like experience.
- Continuous, flicker-free dimming from 100% to 1%¹.
- Dimming Method:
 - Constant-current reduction dimming provides video-friendly performance down to 5%
 - PWM dimming below 5% (240 Hz), % Modulation = 100%
- Guaranteed dimming performance when used with Lutron EcoSystem controls.
- Guaranteed compatibility with Energi Savr Node units with EcoSystem, GRAFIK Eye QS with EcoSystem, PowPak dimming module with EcoSystem, and Quantum systems, allowing for integration into a planned or existing EcoSystem lighting control solution.
- QwikFig compatible models available, see **How to Build a Model Number** page for details. For more information, please refer to the QwikFig User Guide (Lutron P/N 041473) or contact your Lutron sales representative.
- Protected from miswires of input power to EcoSystem control inputs up to 277 V \sim .
- Rated lifetime of 50,000 hours at 75 °C (167 °F) calibration point (t_c).
- FCC Part 15 Class A
- 100% performance tested at factory before shipping.
- RoHS compliant.



Case type K

3.00 in (76 mm) W × 1.00 in (25 mm) H × 4.90 in (124 mm) L



Case type M

1.18 in (30 mm) W × 1.00 in (25 mm) H × 14.13 in (359 mm) L

- Non-volatile memory restores all settings after power failure.
- For more information please visit: www.lutron.com/hilume1softbled

EcoSystem Features

- Simpler to wire and more reliable than 0–10 V \sim .
- Guarantees compatibility between Lutron controls, LED drivers, ballasts, and sensors.
- Accommodates zone and control changes without rewiring.
- Link to Lutron Quantum Total Light Management System to monitor lighting power consumption.
- Polarity-free and topology-free.
- Digital EcoSystem intelligence allows easy code compliance.
- Digital EcoSystem control link can be Class 1 or Class 2.

¹ Light output at 1% depends on the efficacy of the LED light engine used with the driver.

Specifications

Regulatory Approvals and Compliance

- UL® Listed Class P
- NOM certified for Mexico (only “BLK” models for use with Lutron QwikFig technology)
- Lutron Quality Systems registered to ISO 9001.2015
- Manufacturing facilities employ ESD reduction practices that comply with the requirements of ANSI/ESD S20.20
- Meets ANSI C62.41 category A surge protection standards up to and including 4 kV
- Inrush current less than NEMA 410-2011 limit
- FCC Part 15 Class A
- Canadian EMI Class A Compliance Equivalent: CAN ICES-005(A)/NMB-005(A)
- Meets UL 8750, “Light Emitting Diode (LED) Equipment For Use in Lighting Products”
- Class 2 output
- LED drivers need to meet certain performance criteria in order for the completed luminaires to comply with the ENERGY STAR® Luminaires V2.0 Specification. All models meet these performance criteria throughout their entire load compatibility regions. Consult Application Note #599 (P/N 048599), **ENERGY STAR® Luminaires V2.0 and Lutron Drivers**, at www.lutron.com for availability dates of compliant products
- LED drivers need to meet certain performance criteria in order for the completed luminaires to comply with Title 24 requirements as detailed in CEC-400-2015-037-CMF. All models meet both commercial (at 120 V~/277 V~) and residential (at 120 V~) performance criteria throughout their entire load operating regions. Consult **CEC-400-2015-032-CMF Section 6.2.7** for important information on meeting start-up time requirements with fade-in lighting.
- M-case type performance is in compliance with DLC version 2.1 in designated areas (see “Load Compatibility” graph in **Output Range** pages)

Performance

- Soft-on, Fade-to-Black: fades smoothly between 0% and 1% when turned on and off for an incandescent-like experience
- Dimming Range: 100% to 1%¹
- Operating Voltage: 120 V~ to 277 V~ at 50/60 Hz
- Lifetime: 50,000 hours when calibration point (t_c) at 75 °C (167 °F)²
- For rated warranty, t_c not to exceed 75 °C (167 °F) (maximum rated temperature)²

- Patented thermal foldback protection
- At turn on, lighting fades smoothly to the desired level without decreasing or flashing to full brightness
- Non-volatile memory restores all driver settings after power failure
- Typical standby power consumption: 0.2 W at 120 V~ and 0.3 W at 277 V~
- Open-circuit protected output
- Short-circuit and overload-protected output
- Class 2 output designed to withstand hot swap of the LED load

Environmental

- Sound rated: Class A inaudible in 24 dBA ambient
- Relative Humidity: maximum 90% non-condensing
- Minimum Operating Ambient Temperature: $t_a = 0\text{ °C}$ (32 °F)³
- Indoor use only
- Rated for dry and damp locations

Driver Wiring and Mounting

- Driver is grounded by a mounting screw to the grounded fixture or by terminal connection
- Terminal blocks on the driver accept one solid wire per terminal from 18 AWG to 16 AWG (0.75 mm² to 1.5 mm²)
- Fixture must be grounded in accordance with local and national electrical codes
- Maximum driver-to-LED light engine wire length for:

Wire Gauge	Maximum Lead Length		
	150 mA to 700 mA	710 mA to 1.50 A	1.51 A to 2.10 A
18 AWG (0.75 mm ²)	30 ft (9 m)	15 ft (4.5 m)	10 ft (3 m)
16 AWG (1.5 mm ²)	35 ft (10.5 m)	25 ft (7.5 m)	15 ft (4.5 m)
14 AWG (2.5 mm ²) ⁴	50 ft (15 m)	40 ft (12 m)	25 ft (7.5 m)
12 AWG (4.0 mm ²) ⁴	100 ft (30 m)	60 ft (18 m)	40 ft (12 m)

¹ Light output at 1% depends on the efficacy of the LED light engine used with the driver.

² To maintain warranty, installer is responsible for ensuring that the driver calibration point does not exceed 75 °C (167 °F).

³ Where t_a is the temperature of the air directly surrounding the driver.

⁴ Terminal blocks on the drivers accept only solid 18 AWG to 16 AWG (0.75 mm² to 1.5 mm²) wire. To use wire gauges larger than the terminal blocks' rated gauge of 16 AWG (1.5 mm²) refer to the **Terminal Wiring Gauges** diagram. Connect up to 3 ft (1.0 m) of 18 AWG to 16 AWG (0.75 mm² to 1.5 mm²) wire to the LED driver terminal blocks, then connect 12 AWG or 14 AWG (4.0 mm² or 2.5 mm²) up to the length allowed in the above table.

How to Select the Correct LED Driver for Your Load

1. Review the specifications of the LED load.
2. Identify the minimum and maximum operating voltage of the LED load at the desired operating current. This "current" will be the rated output current of the LED driver. Consult the LED load manufacturer for any questions.

Example: An LED load that is rated at 1 A and 33 V nominally, has an output voltage range of 28–38 V (at 1 A) due to unit-to-unit variation, temperature, etc.

3. Determine the proper operating range of the LED driver.
 - a. Identify the output range(s) of the driver family that includes the desired current.

i. Select Current

Example: Only "B", "C", "U", and "V" models meet the current range of the selected load (1 A).

LED Load Output Range

L = 0.15–0.32 A, 20–40 V_{DC}, 5–10 W

M = 0.25–0.50 A, 20–40 V_{DC}, 6.5–14 W

N = 0.35–0.75 A, 20–40 V_{DC}, 10–20 W

B = 0.50–1.25 A, 20–40 V_{DC}, 15–35 W

C = 0.88–1.75 A, 20–40 V_{DC}, 25–50 W

D = 1.25–2.10 A, 20–40 V_{DC}, 35–75 W

J = 0.15–0.30 A, 30–50 V_{DC}, 6–12 W

K = 0.24–0.50 A, 30–50 V_{DC}, 9–20 W

T = 0.40–0.83 A, 30–50 V_{DC}, 15–35 W

U = 0.70–1.33 A, 30–50 V_{DC}, 25–50 W

V = 1.00–1.88 A, 30–50 V_{DC}, 40–75 W

ii. Select Voltage

Example: Out of the 4 models indicated above, only "B" and "C" models meet the voltage requirement for the selected load (28–38 V).

LED Load Output Range

L = 0.15–0.32 A, 20–40 V_{DC}, 5–10 W

M = 0.25–0.50 A, 20–40 V_{DC}, 6.5–14 W

N = 0.35–0.75 A, 20–40 V_{DC}, 10–20 W

B = 0.50–1.25 A, 20–40 V_{DC}, 15–35 W

C = 0.88–1.75 A, 20–40 V_{DC}, 25–50 W

D = 1.25–2.10 A, 20–40 V_{DC}, 35–75 W

J = 0.15–0.30 A, 30–50 V_{DC}, 6–12 W

K = 0.24–0.50 A, 30–50 V_{DC}, 9–20 W

T = 0.40–0.83 A, 30–50 V_{DC}, 15–35 W

U = 0.70–1.33 A, 30–50 V_{DC}, 25–50 W

V = 1.00–1.88 A, 30–50 V_{DC}, 40–75 W

How to Select the Correct LED Driver for Your Load (continued)

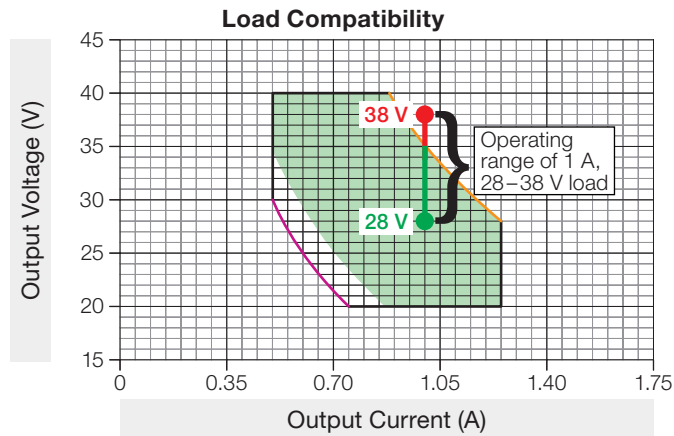
b. Examine the **Load Compatibility** graphs below for each output range to ensure that the voltage range of the LED load is within the safe operating area.

iii. Select Power

Example: Lines marked below indicate load specifications (28–38 V at 1 A).

“B” Model (Not Compatible) ❌

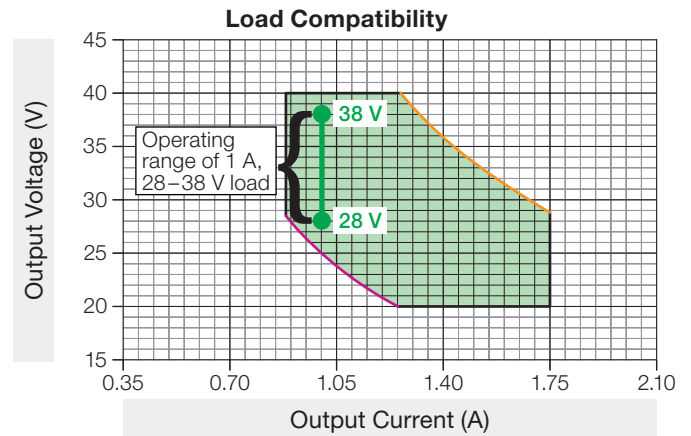
Since the maximum voltage of the load (38 V) exceeds the allowable voltage of “B” model (35 V at 1 A), this model is not compatible.



Key: Shaded area meets DLC Version 2.1 (areas outside of shaded areas may not meet THD [total harmonic distortion] or PF [power factor] requirements).
 Constant 15 W output Constant 35 W output

“C” Model (Compatible) ✅

Operating voltage range for “C” model is 25–40 V at 1 A. Since the load specifications are within the operating range, “C” model is compatible for this load.



Key: Shaded area meets DLC Version 2.1 (areas outside of shaded areas may not meet THD [total harmonic distortion] or PF [power factor] requirements).
 Constant 25 W output Constant 50 W output

4. See **How to Build A Model Number** to create the appropriate model number for the desired driver. If a QwikFig compatible driver is needed, identify the proper **LED Load Output Range** (voltage and current) and insert “BLK” in the **Current Level (for Constant Current)** section of the model number.

Load Learning

What is load learning?

Each Lutron constant-current LED driver is able to operate over a range of LED load voltages. In order to operate with optimum efficiency, these drivers continuously sense the LED load voltage and make adjustments to their internal operation.

When does load learning happen?

Load learning happens continuously and in most cases is imperceptible. However, when a new load is connected to the driver it will take some time for the LED driver to adapt. A driver may be performing load learning during R&D/bench testing, production testing, or QwikFig/AirFig configuration when using a real load. If a driver was not allowed to learn its load during the fixture production process, it may happen when first installed in the final location.

What does load learning look like?

Depending on the difference in forward voltage of the new load versus the last load the driver learned, one of the following may be observed:

1. The load may seem to operate properly.
2. The load may turn on at a low light level and remain there for a few seconds before transitioning to full light.
3. The load may turn on for a very brief flash, then go off for a few seconds before turning back on again.
4. There may be no light output at all for up to 20 seconds.

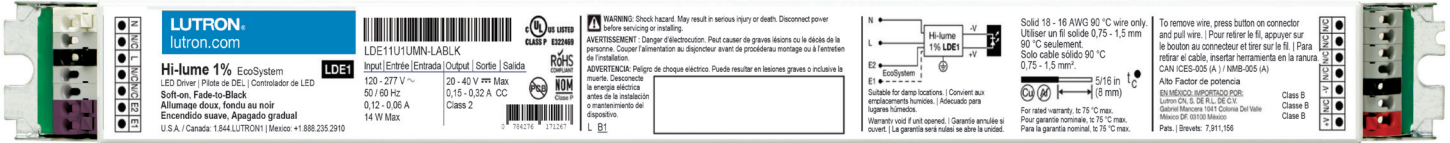
How do I make a driver “learn” a new load?

Although this process will happen on its own during normal usage, Lutron recommends the following procedure be carried out before attempting to confirm proper operation:

1. Power up the LED driver on the intended load.
2. Once the light seems to be stable at full output, which may take 20 to 30 seconds, leave the driver on for another 20 seconds for the driver to learn the load voltage and commit it to memory.

Note: There is no limit to the number of times a driver can learn a new load.

How to Build a Model Number, M-Case Type (“BLK” models for use with Lutron QwikFig technology): Hi-lume 1% EcoSystem (up to 75 W) LED Driver with Soft-on, Fade-to-Black



M-case type

L D E 1 U 1 U M N - A

LED Load Power Range

(Power Range number is based on Load Output Range category)

- 1: select if LED Load Output Range is “J,” “L,” or “M”
- 2: select if LED Load Output Range is “K” or “N”
- 3: select if LED Load Output Range is “B” or “T”
- 5: select if LED Load Output Range is “C” or “U”
- 7: select if LED Load Output Range is “D” or “V”

LED Load Output Range: Class 2 Constant Current

(see the following pages for more detail)

- L: 0.15–0.32 A, 20.0–40.0 V^{***}, 5–10 W
- M: 0.25–0.50 A, 20.0–40.0 V^{***}, 6.5–14 W
- N: 0.35–0.75 A, 20.0–40.0 V^{***}, 10–20 W
- B: 0.50–1.25 A, 20.0–40.0 V^{***}, 15–35 W
- C: 0.88–1.75 A, 20.0–40.0 V^{***}, 25–50 W
- D: 1.25–2.10 A, 20.0–40.0 V^{***}, 35–75 W
- J: 0.15–0.30 A, 30.0–50.0 V^{***}, 6–12 W
- K: 0.24–0.50 A, 30.0–50.0 V^{***}, 9–20 W
- T: 0.40–0.83 A, 30.0–50.0 V^{***}, 15–35 W
- U: 0.70–1.33 A, 30.0–50.0 V^{***}, 25–50 W
- V: 1.00–1.88 A, 30.0–50.0 V^{***}, 40–75 W

Current Level (for Constant-Current)

- 015 = 0.15 A

Option 1: Order a driver configured by Lutron to a desired output current.

Example: LDE13U1UMN-BA070 has been pre-configured at Lutron to an output of 0.70 A. Refer to the example above.

- 210 = 2.10 A

Note: Lutron pre-configured drivers are *not* QwikFig compatible and cannot be re-configured.

Option 2: Order a QwikFig compatible driver.

Example: LDE13U1UMN-BABLK (0.5–1.25 A)*

Note: Default set to minimum output current for the respective **LED Load Output Range**.

Attention: Model numbers may appear similar to Lutron Hi-lume 1% EcoSystem, Hi-lume 1% 3-wire, or Hi-lume 1% 2-wire drivers, but they are not direct model-for-model replacements. Please note the driver’s output rating and the load ratings to select the correct product for your fixture.

* Output voltage range changes with output current and according to power limits. Check driver specifications on the following pages carefully to understand output voltage range of a particular SKU. Purchaser is responsible for electrical compatibility between LED driver and LED load.

Example: LDE13U1UMN-BA070



- 0.70 A
- 15–28 W^{**}
- 21.5–40.0 V[†] LED driver

For further assistance in selecting your model number, contact our LED Center of Excellence at LEDs@lutron.com

^{**} At 0.7 A, maximum voltage of 40 V provides 28 W (0.7 A × 40.0 V = 28 W)

[†] Minimum voltage of LDE13U1UMN-BA070 limited by 15 W minimum power: 15 W ÷ 0.70 A = 21.5 V

M-Case Models: "L" Output Range

Driver Type	Output Voltage	Output Current	Output Power	Standards Recognition	Maximum Rated Temp. @ t_c for Warranty
Constant Current Driver (Class 2)	20–40 V \sim	0.15–0.32 A*	5–10 W	 	75 °C

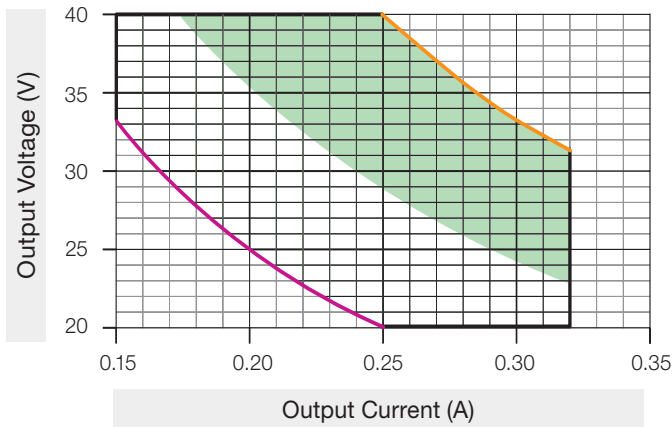
* QwikFig compatible model number LDE11U1UMN-LABLK is configurable to any current within this range in 0.01 A increments.

** BLK model LDE11U1UMN-LABLK is NOM certified and available for Mexico.

Typical Performance Specifications:

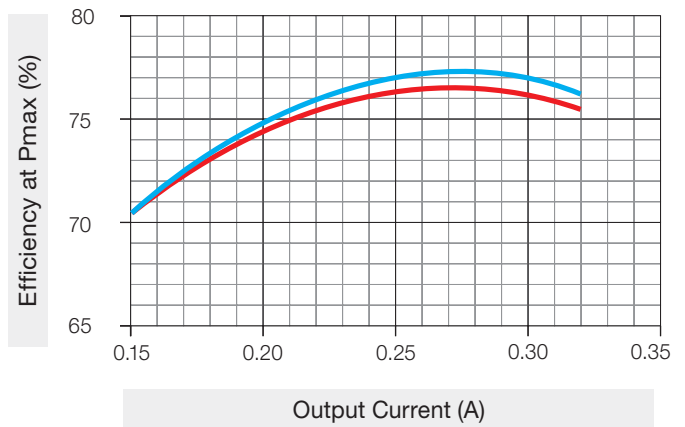
Parameter	Value	Test Conditions
Input Current	0.05 A	$V_i = 277\text{ V}\sim$, $t_a = 25\text{ }^\circ\text{C}$, $I_o = 0.25\text{ A}$, $V_o = 40\text{ V}\sim$, Maximum Light Output LDE11U1UMN-LA025
Power Factor	0.93	
THD	18%	
Driver Efficiency	78%	

Load Compatibility



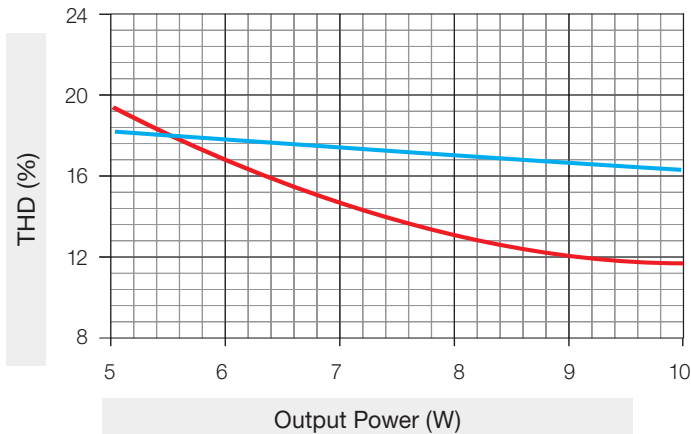
Key:
■ Shaded area meets DLC Version 2.1 (areas outside of shaded areas may not meet THD or PF requirements).
— Constant 5 W output — Constant 10 W output

Typical Efficiency vs. Output Current



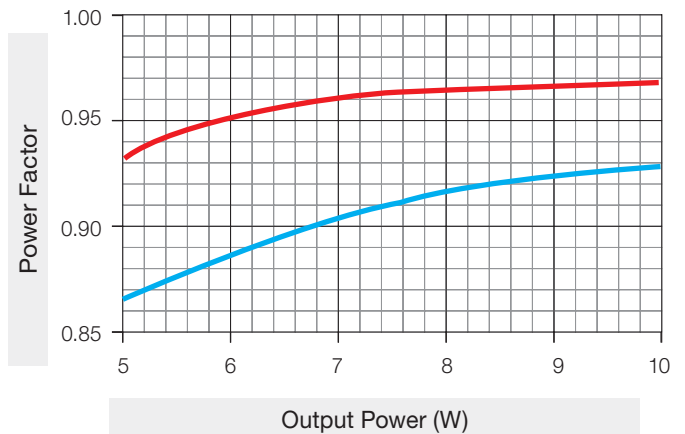
Key: — 120 V \sim — 277 V \sim

Typical THD vs. Output Power



Key: — 120 V \sim — 277 V \sim

Typical Power Factor vs. Output Power



Key: — 120 V \sim — 277 V \sim

M-Case Models: "T" Output Range (continued)

Model number* LDE13U1UMN-	Rated Output Current (A)	Compatible Load Voltage (V)		Typical Performance at Minimum Compatible Load Voltage			Typical Performance at Maximum Compatible Load Voltage		
		Minimum	Maximum	Power Factor at 120 V~/277 V~	THD at 120 V~/277 V~	Efficiency at 120 V~/277 V~	Power Factor at 120 V~/277 V~	THD at 120 V~/277 V~	Efficiency at 120 V~/277 V~
-TA040	0.40	37.5	50.0	0.98/0.91	15%/17%	79%/81%	0.99/0.94	13%/15%	83%/83%
-TA041	0.41	36.6	50.0	0.98/0.91	15%/17%	79%/80%	0.99/0.94	13%/15%	83%/84%
-TA042	0.42	35.7	50.0	0.98/0.91	15%/17%	79%/80%	0.99/0.94	13%/14%	83%/84%
-TA043	0.43	34.9	50.0	0.98/0.91	15%/16%	79%/80%	0.99/0.94	12%/14%	83%/84%
-TA044	0.44	34.1	50.0	0.98/0.91	15%/17%	79%/80%	0.99/0.94	12%/14%	83%/84%
-TA045	0.45	33.3	50.0	0.98/0.91	15%/17%	79%/80%	0.99/0.94	12%/14%	84%/85%
-TA046	0.46	32.6	50.0	0.98/0.91	15%/17%	79%/80%	0.99/0.95	12%/14%	84%/85%
-TA047	0.47	31.9	50.0	0.98/0.91	15%/16%	79%/80%	0.99/0.95	12%/14%	84%/85%
-TA048	0.48	31.3	50.0	0.98/0.91	15%/16%	79%/80%	0.99/0.95	12%/14%	84%/85%
-TA049	0.49	30.6	50.0	0.98/0.91	15%/16%	79%/80%	0.99/0.95	11%/13%	84%/85%
-TA050	0.50	30.0	50.0	0.98/0.91	15%/16%	79%/80%	0.99/0.95	11%/13%	84%/86%
-TA051	0.51	30.0	50.0	0.98/0.91	14%/16%	79%/80%	0.99/0.95	11%/13%	84%/86%
-TA052	0.52	30.0	50.0	0.98/0.91	14%/16%	79%/81%	0.99/0.95	11%/13%	85%/86%
-TA053	0.53	30.0	50.0	0.98/0.91	14%/16%	79%/81%	0.99/0.96	11%/13%	85%/86%
-TA054	0.54	30.0	50.0	0.98/0.92	14%/15%	79%/81%	0.99/0.96	11%/13%	85%/86%
-TA055	0.55	30.0	50.0	0.98/0.92	14%/16%	80%/81%	0.99/0.96	10%/13%	85%/86%
-TA056	0.56	30.0	50.0	0.98/0.92	14%/15%	80%/81%	0.99/0.96	10%/13%	85%/86%
-TA057	0.57	30.0	50.0	0.98/0.92	14%/15%	80%/81%	0.99/0.96	10%/13%	85%/86%
-TA058	0.58	30.0	50.0	0.98/0.92	13%/15%	80%/81%	0.99/0.96	10%/13%	85%/87%
-TA059	0.59	30.0	50.0	0.98/0.92	13%/15%	80%/81%	0.99/0.96	10%/13%	85%/87%
-TA060	0.60	30.0	50.0	0.98/0.93	13%/15%	80%/82%	0.99/0.96	10%/13%	85%/87%
-TA061	0.61	30.0	50.0	0.99/0.93	13%/15%	80%/82%	0.99/0.96	10%/13%	85%/87%
-TA062	0.62	30.0	50.0	0.99/0.93	13%/15%	81%/82%	0.99/0.96	9%/13%	85%/87%
-TA063	0.63	30.0	50.0	0.99/0.93	13%/14%	81%/82%	0.99/0.96	9%/13%	85%/87%
-TA064	0.64	30.0	50.0	0.99/0.93	13%/14%	81%/82%	0.99/0.96	9%/13%	85%/87%
-TA065	0.65	30.0	50.0	0.99/0.93	13%/14%	81%/82%	0.99/0.97	9%/13%	86%/87%
-TA066	0.66	30.0	50.0	0.99/0.93	12%/14%	81%/82%	0.99/0.97	9%/13%	86%/87%
-TA067	0.67	30.0	50.0	0.99/0.94	13%/14%	82%/82%	0.99/0.97	9%/12%	86%/88%
-TA068	0.68	30.0	50.0	0.99/0.94	13%/14%	82%/83%	0.99/0.97	9%/13%	86%/88%
-TA069	0.69	30.0	50.0	0.99/0.94	13%/14%	82%/83%	0.99/0.97	9%/12%	86%/88%
-TA070	0.70	30.0	50.0	0.99/0.94	13%/14%	82%/83%	0.99/0.97	8%/12%	86%/88%
-TA071	0.71	30.0	49.3	0.99/0.94	13%/14%	82%/83%	0.99/0.97	8%/12%	86%/88%
-TA072	0.72	30.0	48.6	0.99/0.94	12%/14%	82%/83%	0.99/0.97	9%/12%	86%/88%
-TA073	0.73	30.0	48.0	0.99/0.94	12%/14%	82%/83%	0.99/0.97	9%/12%	86%/87%
-TA074	0.74	30.0	47.3	0.99/0.94	12%/14%	82%/83%	0.99/0.97	9%/12%	85%/87%
-TA075	0.75	30.0	46.7	0.99/0.94	12%/14%	82%/83%	0.99/0.97	9%/12%	85%/87%
-TA076	0.76	30.0	46.1	0.99/0.94	12%/14%	82%/83%	0.99/0.97	8%/12%	85%/87%
-TA077	0.77	30.0	45.5	0.99/0.95	12%/14%	82%/83%	0.99/0.97	8%/12%	85%/87%