

SFPTURKIYESSM01008GD

8Gbps 1310nm LC Duplex 10km SFP+ Transceiver

Features :

- Up Up to 8.5 Gb/s bi-directional data links
- Hot-Pluggable
- Duplex LC connector
- 1310nm DFB laser transmitter, PIN photo-detector
- SMF links up to 10km on 9/125µm
- 2-wire interface for management specifications compliant with SFF 8472 digital diagnostic monitoring interface
- Power Supply :+3.3V
- Power consumption<1.5W
- Temperature Range: 0~ 70°C
- RoHS compliant

Applications:

- 1 Tri Rate 2.125 / 4.25 / 8.5 Gb/s Fibre Channel through Rate Select
- 8G Fibre Channel



Description:

SFPTURKIYESSM01008GD is a very compact 8.5Gb/s optical transceiver module for serial optical communication applications at 8.5Gb/s.

SFPTURKIYESSM01008GD converts a 8.5Gb/s serial electrical data stream to 8.5Gb/s optical output signal and a 8.5Gb/s optical input signal to 8.5Gb/s serial electrical data streams. The high speed 8.5Gb/s electrical interface is fully compliant with SFI specification.

The high performance 1310nm DFB transmitter and high sensitivity PIN receiver provide superior performance for Ethernet applications at up to 10km links

The SFP+ Module compliants with SFF-8431, SFF-8432 and IEEE 802.3ae 10GBASE-LR. Digital diagnostics functions are available via a 2-wire serial interface, as specified in SFF-8472.

The fully SFP compliant form factor provides hot pluggability, easy optical port upgrades and low EMI emission.



Absolute Maximum Ratings

| Parameter | Symbol | Min. | Typical | Max. | Unit |
|----------------------------|----------|------|---------|------|------|
| Storage Temperature | T_S | -40 | | +85 | °C |
| Case Operating Temperature | T_A | 0 | | 70 | °C |
| Maximum Supply Voltage | V_{CC} | -0.5 | | 4 | V |
| Relative Humidity | RH | 0 | | 85 | % |

Electrical Characteristics ($T_{OP} = 0$ to 70 °C, $V_{CC} = 3.135$ to 3.465 Volts)

| Parameter | Symbol | Min | Typical | Max | Unit | Notes |
|---|------------------|-------|---------|--------------|----------|-------|
| Supply Voltage | V_{CC} | 3.135 | | 3.465 | V | |
| Supply Current | I_{CC} | | 200 | 300 | mA | |
| Power Consumption | P | | | 1.5 | W | |
| Transmitter Section: | | | | | | |
| Input differential impedance | R_{in} | | 100 | | Ω | 1 |
| Tx Input Single Ended DC Voltage Tolerance (Ref VeeT) | V | -0.3 | | 4 | V | 2 |
| Differential input voltage swing | $V_{in,pp}$ | 90 | | 800 | mV | |
| Transmit Disable Voltage | V_D | 2 | | V_{CC} | V | 3 |
| Transmit Enable Voltage | V_{EN} | Vee | | $V_{ee}+0.8$ | V | 3 |
| Receiver Section: | | | | | | |
| Single Ended Output Voltage Tolerance | V | -0.3 | | 4 | V | |
| Single ended data output swing | V_o | 185 | | 425 | mV | 5 |
| Data output rise/fall time, 2.125, 4.25 Gb/s | Tr/Tf | | | 120 | ps | 6 |
| Data output rise/fall time, 8.5 Gb/s | Tr/Tf | 30 | | 60 | ps | 6 |
| LOS Fault | $V_{LOS\ fault}$ | 2 | | V_{CCHOST} | V | 7 |
| LOS Normal | $V_{LOS\ norm}$ | Vee | | $V_{ee}+0.8$ | V | 7 |
| Power Supply Rejection | PSR | 100 | | | mV pp | 8 |
| Deterministic Jitter Contribution < 4.25 Gb/s | $RX\ \Delta DJ$ | | | 51.7 | ps | 9,10 |
| Total Jitter Contribution < 4.25 Gb/s | $RX\ \Delta TJ$ | | | 122.4 | PS | 10 |
| Deterministic Jitter Contribution = 4.25 Gb/s | $RX\ \Delta DJ$ | | | 25.9 | PS | 9,10 |
| Total Jitter Contribution = 4.25 Gb/s | $RX\ \Delta TJ$ | | | 61.2 | PS | 10 |



Notes:

1. Non-condensing.
2. Module power consumption never exceeds 1W.
3. AC coupled.
4. Or open circuit.
5. Into 100 ohms differential termination.
6. 20%~80%
7. LOS is LVTTTL. Logic 0 indicates normal operation; logic 1 indicates no signal detected.
8. All transceiver specifications are compliant with a power supply sinusoidal modulation of 20 Hz to 1.5 MHz up to specified value applied through the power supply filtering network shown on page 23 of the Small Form-factor Pluggable (SFP) Transceiver MultiSource Agreement (MSA)6, September 14, 2000. The Power Supply Rejection applies for a supply voltage range of 3.1 to 3.6 V.
9. Measured with DJ-free data input signal. In actual application, output DJ will be the sum of input DJ
10. For 8.5 Gb/s operation, Deterministic Jitter and Total Jitter are not specified per FC-P1-4 Rev 8.00.

Jitter values for gamma T and gamma R are controlled by TDP and stressed receiver sensitivity.

Optical Parameters(T_{OP} = -5 to 85°C, VCC = 3.135 to 3.465 Volts)

| Parameter | Symbol | Min | Typical | Max | Unit | Notes |
|--------------------------------|-------------------|------|---------|-------|-------|-------|
| Transmitter Section: | | | | | | |
| Center Wavelength | λ_t | 1290 | 1310 | 1330 | nm | |
| spectral width | $\Delta\lambda$ | | | 1 | nm | |
| Average Optical Power | P _{avg} | -8.2 | | 0.5 | dBm | 1 |
| Optical Power OMA | P _{oma} | -5.2 | | | dBm | |
| Laser Off Power | P _{off} | | | -30 | dBm | |
| Extinction Ratio | ER | 3.5 | | | dB | 7 |
| Extinction Ratio | ER | 6 | | | dB | 6 |
| Transmitter Dispersion Penalty | TDP | | | 3.2 | dB | 2 |
| Relative Intensity Noise | R _{in} | | | -128 | dB/Hz | 3 |
| Optical Return Loss Tolerance | | 20 | | | dB | |
| Receiver Section: | | | | | | |
| Center Wavelength | λ_r | 1260 | | 1355 | nm | |
| Receiver Sensitivity | Sen | | | -14.5 | dBm | 4,7 |
| Receiver Sensitivity | Sen | | | -14.5 | dBm | 4,6 |
| Stressed Sensitivity (OMA) | Sen _{ST} | | | -10.3 | dBm | 4 |
| Los Assert | LOS _A | -30 | | - | dBm | |
| Los Dessert | LOS _D | | | -19 | dBm | |
| Los Hysteresis | LOS _H | 0.5 | | | dB | |
| Overload | Sat | 0 | | | dBm | 5 |
| Receiver Reflectance | R _{rx} | | | -12 | dB | |

Note:

1. Average power figures are informative only, per IEEE802.3ae.
2. TWDP figure requires the host board to be SFF-8431 compliant. TWDP is calculated using the Matlab code provided in clause 68.6.6.2 of IEEE802.3ae.
3. 12dB reflection.



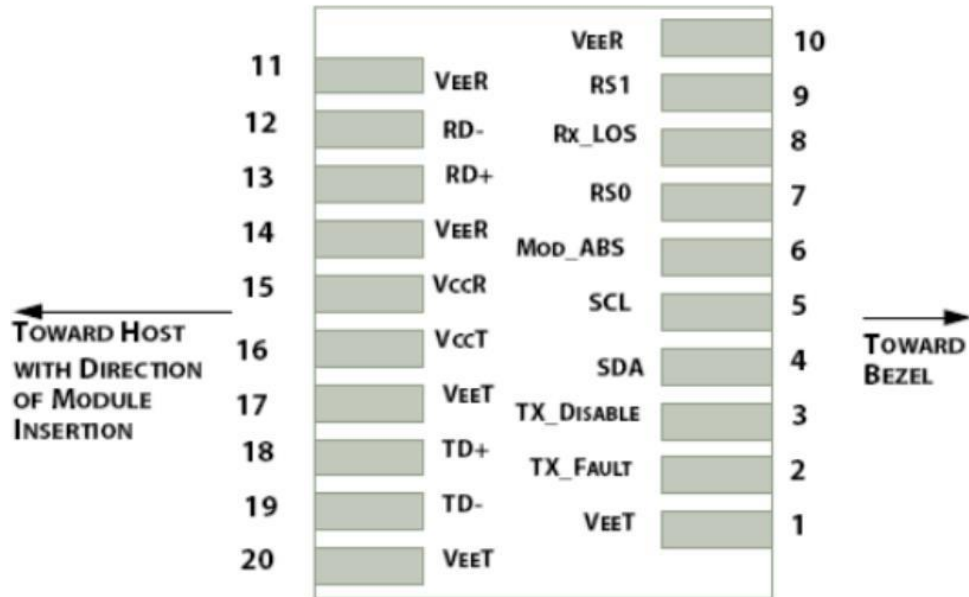
4. Conditions of stressed receiver tests per IEEE802.3ae. CSRS testing requires the host board to be SFF-8431 compliant.
5. Receiver overload specified in OMA and under the worst comprehensive stressed condition.
6. SONET OC-192 / SDH
7. 10GBASE-LR/LW Ethernet

Timing Characteristics

| Parameter | Symbol | Min. | Typical | Max. | Unit |
|--|------------------------|------|---------|------|------|
| TX_Disable Assert Time | t_off | | | 10 | us |
| TX_Disable Negate Time | t_on | | | 1 | ms |
| Time to Initialize Include Reset of TX_FAULT | t_int | | | 300 | ms |
| TX_FAULT from Fault to Assertion | t_fault | | | 100 | us |
| TX_Disable Time to Start Reset | t_reset | 10 | | | us |
| Receiver Loss of Signal Assert Time | T _A ,RX_LOS | | | 100 | us |
| Receiver Loss of Signal Deassert Time | T _d ,RX_LOS | | | 100 | us |
| Rate-Select Chage Time | t_ratesel | | | 10 | us |
| Serial ID Clock Time | t_serial-clock | | | 100 | kHz |

Pin Assignment

Diagram of Host Board Connector Block Pin Numbers and Name



Pin Function Definitions

| Pin | Name | Function | Notes |
|-----|------------|---|-------|
| 1 | VeeT | Module transmitter ground | 1 |
| 2 | Tx Fault | Module transmitter fault | 2 |
| 3 | Tx Disable | Transmitter Disable; Turns off transmitter laser output | 3 |
| 4 | SDA | 2 wire serial interface data input/output (SDA) | 4 |
| 5 | SCL | 2 wire serial interface clock input (SCL) | 4 |
| 6 | MOD-ABS | Module Absent, connect to VeeR or VeeT in the module | 4 |
| 7 | RS0 | Rx Rate Select: Open or Low = High = 2.125 or 4.25 Gb/s Fibre Channel (Low Bandwidth) 8.5 Gb/s Fibre Channel (High Bandwidth) | 5 |
| 8 | LOS | Receiver Loss of Signal Indication. Logic 0 indicates normal operation. | 6 |
| 9 | RS1 | Tx Rate Select: Open or Low = High = 2.125 or 4.25 Gb/s Fibre Channel (Low Bandwidth) 8.5 Gb/s Fibre Channel (High Bandwidth) | 5 |
| 10 | VeeR | Module receiver ground | 1 |
| 11 | VeeR | Module receiver ground | 1 |
| 12 | RD- | Receiver inverted data out put | |
| 13 | RD+ | Receiver non-inverted data out put | |
| 14 | VeeR | Module receiver ground | 1 |
| 15 | VccR | Module receiver 3.3V supply | |
| 16 | VccT | Module transmitter 3.3V supply | |
| 17 | VeeT | Module transmitter ground | 1 |
| 18 | TD+ | Transmitter inverted data out put | |
| 19 | TD- | Transmitter non-inverted data out put | |
| 20 | VeeT | Module transmitter ground | 1 |

Notes:

- The module ground pins shall be isolated from the module case.
- TFAULT is an open collector/drain output, which should be pulled up with a 4.7k – 10k Ohms resistor on the host board if intended for use. Pull up voltage should be between 2.0V to Vcc + 0.3V. A high output indicates a transmitter fault caused by either the TX bias current or the TX output power exceeding the preset alarm thresholds. A low output indicates normal operation. In the low state, the output is pulled to <0.8V.
- Laser output disabled on TDIS >2.0V or open, enabled on TDIS <0.8V
- Should be pulled up with 4.7k – 10kohms on host board to a voltage between 2.0V and 3.6V. MOD_ABS pulls line low to indicate module is plugged in.
- Rate select can also be set through the 2-wire bus in accordance with SFF-8472 v. 10.2. Rx Rate Select is set at Bit 3, Byte 110, Address A2h. Tx Rate Select is set at Bit 3, Byte 118, Address A2h. Note: writing a “1” selects maximum bandwidth operation. Rate select is the logic OR of the input state of Rate Select Pin and 2-wire bus.
- LOS is open collector output. Should be pulled up with 4.7k – 10kohms on host board to a voltage between 2.0V and 3.6V. Logic 0 indicates normal operation; logic 1 indicates loss of signal.



SFP Module EEPROM Information and Management

The SFP modules implement the 2-wire serial communication protocol as defined in the SFF-8472. The serial ID information of the SFP modules and Digital Diagnostic Monitor parameters can be accessed through the I2C interface at address A0h and A2h. The memory is mapped in Table 1. Detailed ID information (A0h) is listed in Table 2. And the DDM specification at address A2h. For more details of the memory map and byte definitions, please refer to the SFF-8472, "Digital Diagnostic Monitoring Interface for Optical Transceivers". The DDM parameters have been internally calibrated.

Table 1. Digital Diagnostic Memory Map (Specific Data Field Descriptions)

| 2 wire address 1010000X (A0h) | 2 wire address 1010001X (A2h) |
|-------------------------------|-------------------------------|
| 0 | 0 |
| 95 | 55 |
| 127 | 95 |
| 255 | 119 |
| | 127 |
| | 247 |
| | 255 |

Serial ID Defined by SFP MSA (96 bytes)
Vendor Specific (32 bytes)
Reserved (128 bytes)

Alarm and Warning Thresholds (56 bytes)
Cal Constants (40 bytes)
Real Time Diagnostic Interface (24 bytes)
Vendor Specific (8 ytes)
User Writable EEPROM (120 bytes)
Vendor Specific (8 ytes)

Table 2 - EEPROM Serial ID Memory Contents (A0h)

| Data Address | Length (Byte) | Name of Length | Description and Contents |
|-----------------------|---------------|----------------|--|
| Base ID Fields | | | |
| 0 | 1 | Identifier | Type of Serial transceiver (03h=SFP) |
| 1 | 1 | Reserved | Extended identifier of type serial transceiver (04h) |
| 2 | 1 | Connector | Code of optical connector type (07=LC) |
| 3-10 | 8 | Transceiver | 8G Base-LR |
| 11 | 1 | Encoding | 64B/66B |
| 12 | 1 | BR, Nominal | Nominal baud rate, unit of 100Mbps |
| 13-14 | 2 | Reserved | (0000h) |
| 15 | 1 | Length(9um) | Link length supported for 9/125um fiber, units of 100m |

| | | | |
|----------------------------------|-----|----------------|--|
| 16 | 1 | Length(50um) | Link length supported for 50/125um fiber, units of 10m |
| 17 | 1 | Length(62.5um) | Link length supported for 62.5/125um fiber, units of 10m |
| 18 | 1 | Length(Copper) | Link length supported for copper, units of meters |
| 19 | 1 | Reserved | |
| 20-35 | 16 | Vendor Name | SFP vendor name: SFPTURKEY |
| 36 | 1 | Reserved | |
| 37-39 | 3 | Vendor OUI | SFP transceiver vendor OUI ID |
| 40-55 | 16 | Vendor PN | Part Number: (ASCII) |
| 56-59 | 4 | Vendor rev | Revision level for part number |
| 60-62 | 3 | Reserved | |
| 63 | 1 | CCID | Least significant byte of sum of data in address 0-62 |
| Extended ID Fields | | | |
| 64-45 | 2 | Option | Indicates which optical SFP signals are implemented (001Ah = LOS, TX_FAULT, TX_DISABLE all supported) |
| 66 | 1 | BR, max | Upper bit rate margin, units of % |
| 67 | 1 | BR, min | Lower bit rate margin, units of % |
| 68-83 | 16 | Vendor SN | Serial number (ASCII) |
| 84-91 | 8 | Date code | Manufacturing date code |
| 92-94 | 3 | Reserved | |
| 95 | 1 | CCEX | Check code for the extended ID Fields (addresses 64 to 94) |
| Vendor Spesific ID Fields | | | |
| 96-127 | 32 | Readable | Sfpturkey specific date, read only |
| 128-255 | 128 | Reserved | Reserved for SFF-8079 |

Digital Diagnostic Monitor Characteristics

| Data Address | Parameter | Accuracy | Unit |
|--------------|----------------------------------|----------|------|
| 96-97 | Transceiver Internal Temperature | ±3.0 | °C |
| 100-101 | Laser Bias Current | ±10 | % |
| 100-101 | Tx Output Power | ±3.0 | dBm |
| 100-101 | Rx Input Power | ±3.0 | dBm |
| 100-101 | VCC3 Internal Supply Voltage | ±3.0 | % |

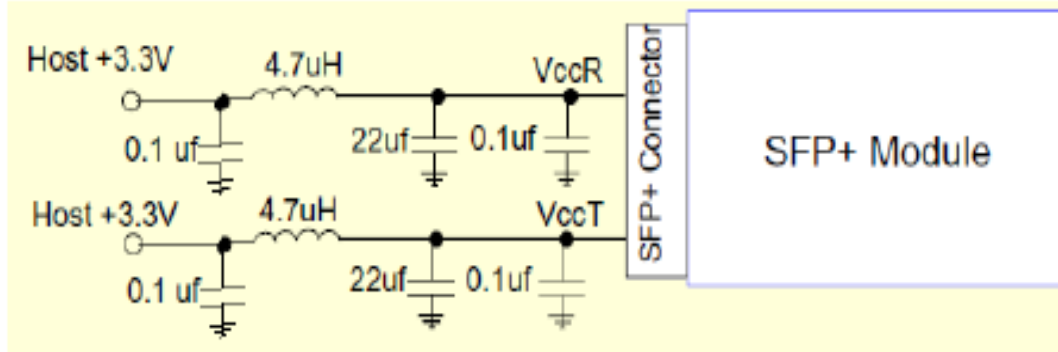


Regulatory Compliance

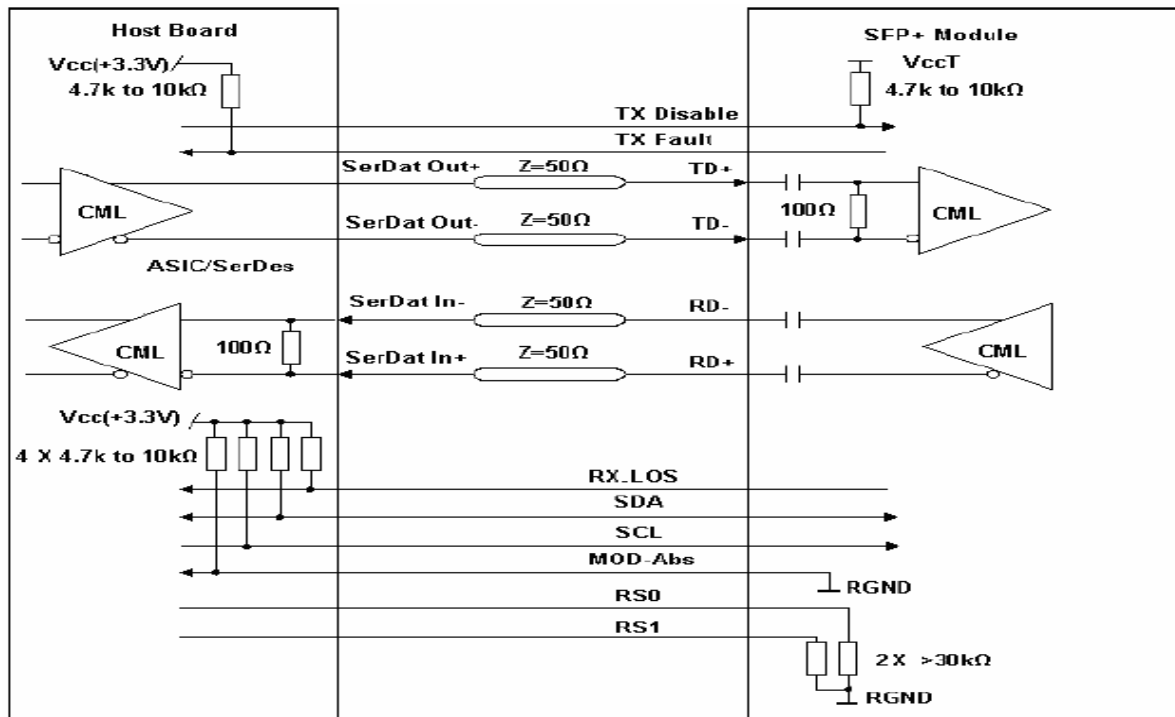
SFPTURKIYESSM01008GD complies with international Electromagnetic Compatibility (EMC) and international safety requirements and standards (see details in Table following).

| Feature | Test | Method |
|--|---|---|
| Electrostatic Discharge (ESD) to the Electrical Pins | MIL-STD-883E Method 3015.7 | Class 1(>1000V for SFI pins, >2000Vfor other pins.) |
| Electrostatic Discharge (ESD) Immunity | IEC61000-4-2 | Class 2(>4.0kV) |
| Electromagnetic Interference (EMI) | CISPR22 ITE Class B FCC Class B CENELEC EN55022 VCCI Class 1 | Comply with standard |
| Immunity | IEC61000-4-3 | Comply with standard |
| Eye Safety | FDA 21CFR 1040.10 and 1040.11 EN (IEC) 60825-1,2 | Compatible with Class I laser Product |

Recommended Circuit

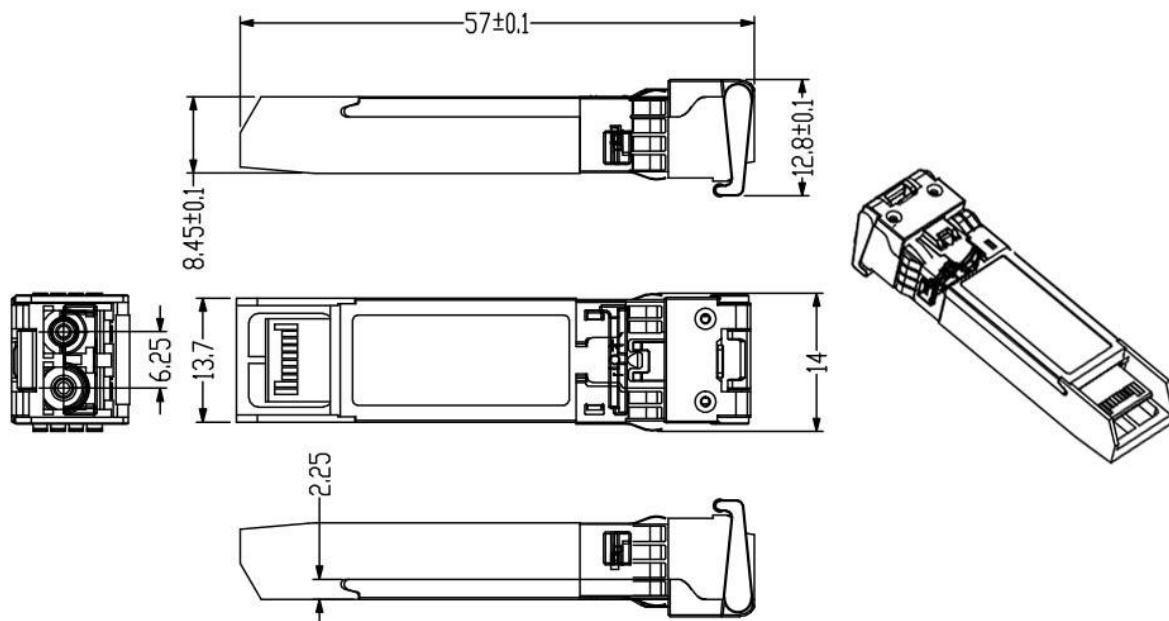


Recommended Host Board Power Supply Circuit



Recommended High-speed Interface Circuit

Mechanical Dimensions



Order Information

Table 6-Order Information

| Part No. | Laser TX(nm) | Laser RX(nm) | Fiber Type | Connector |
|----------------------|-----------------|-----------------|------------|-----------|
| SFPTURKIYESSM01008GD | 1310 | 1310 | SMF | LC |

● Notice

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