



Keywords: transparent operation, T1, E1 framers, transceivers

APPLICATION NOTE 336

Transparent Operation on T1, E1 Framers and Transceivers

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Abstract: The Maxim framers can operate in a transparent mode in both the receive and transmit directions. The transmitter will not insert framing, signaling, or other information such as CRC or FDL. Generally, the receive side of the framers is always transparent. Data received at RTIP and RRING is passed through intact to RSER. All configurations are with the elastic stores disabled. The elastic stores will not alter data except during slip conditions or if configured for 1.544MHz/2.048MHz conversion or signaling reinsertion.

Introduction

This application note applies to the following products.

T1 Framers	E1 Framers	T1/E1/J1 Framers	T1 SCTs	E1 SCTs	T1/E1 SCTs
DS21Q41	DS21Q43	DS26401	DS2151	DS2153	DS2155
DS21Q42	DS21Q44		DS2152	DS2154	DS21Q55
DS21FF42	DS21FF44		DS21352	DS21354	DS2156
DS21FT42	DS21FT44		DS21552	DS21554	DS21455
			DS21Q352	DS21Q354	DS21458
			DS21Q552	DS21Q554	DS26521
				DS2150	DS26524
				DS21Q50	DS26528

The Maxim framers can operate in a transparent mode in both the receive and transmit directions. The transmitter will not insert framing, signaling, or other information such as CRC or FDL. Generally, the receive side of the framers is always transparent. Data received at RTIP and RRING is passed through intact to RSER. All configurations are with the elastic stores disabled. The elastic stores will not alter data except during slip conditions or if configured for 1.544MHz/2.048MHz conversion or signaling reinsertion.

Transparent Operation on DS21Q42, DS21FF42, DS21FT42, DS21352, DS21552, DS21Q352, DS21Q552

Register Configurations:

```
TCR1.2, TCR1.5, TCR1.6 = 1
TCR1.0, TCR1.1, TCR1.4 = 0
TCR2.0 = 0
TIR1, TIR2, TIR3 = 00h
TCC1, TCC2, TCC3 = 00h
RCC1, RCC2, RCC3 = 00h
TDC1.7 = 0
CCR1.5 = 0
RMR1, RMR2, RMR3 = 00h
```

Transparent Operation on DS21Q44, DS21FF44, DS21FT44, DS21354, DS21554, DS21Q354, DS21Q554

Register Configurations:

```
TCR1.6 = 1
TCR1.2, TCR1.3, TCR1.4, TCR1.5 = 0
TCR2.1, TCR2.2, TCR2.3, TCR2.4, TCR2.5, TCR2.6, TCR2.7 = 0
CCR1.4 = 0
CCR2.3, CCR2.4, CCR2.5 = 0
TIR1, TIR2, TIR3, TIR4 = 00h
TCC1, TCC2, TCC3, TCC4 = 00h
RCC1, RCC2, RCC3, RCC4 = 00h
TSaCR = 00h
TDC1.7 = 0
```

Transparent Operation on DS2152

Register Configurations:

```
TCR1.2, TCR1.5, TCR1.6 = 1
TCR1.0, TCR1.1, TCR1.4 = 0
TCR2.0 = 0
TIR1, TIR2, TIR3 = 00h
TCC1, TCC2, TCC3 = 00h
RCC1, RCC2, RCC3 = 00h
CCR1.5 = 0
RMR1, RMR2, RMR3 = 00h
```

Transparent Operation on DS2154

Register Configurations:

TCR1.6 = 1
TCR1.2, TCR1.3, TCR1.4, TCR1.5 = 0
TCR2.1, TCR2.2, TCR2.3, TCR2.4, TCR2.5, TCR2.6, TCR2.7 = 0
CCR1.4 = 0
CCR2.3, CCR2.4, CCR2.5 = 0
CCR4.5 = 0
TIR1, TIR2, TIR3, TIR4 = 00h
TCC1, TCC2, TCC3, TCC4 = 00h
RCC1, RCC2, RCC3, RCC4 = 00h

Transparent Operation on DS2155, DS2156, DS21455, DS21458 and DS21Q55 for E1 Mode

Register Configurations:

MSTRREG = 02h
T1RCR1= 00h, T1RCR2= 00h
T1TCR1= 00h, T1TCR2= 00h
T1CCR1 = 00h
E1RCR1 = 00h, E1RCR2 = 00h
E1TCR1= 80h, E1TCR2= 00h
CCR1 = 00h, CCR2 = 00h, CCR3 = 00h, CCR4 = 00h
H1TC = 00h, H2TC = 00h

Transparent Operation on DS2155, DS2156, DS21455, DS21458 and DS21Q55 for T1 Mode

Register Configurations:

MSTRREG = 00h
T1RCR1= 1Eh, T1RCR2= 60h
T1TCR1= 60h, T1TCR2= 80h
T1CCR1 = 04h
E1RCR1 = 00h, E1RCR2 = 00h
E1TCR1= 00h, E1TCR2= 00h
CCR1 = 00h, CCR2 = 00h, CCR3 = 00h, CCR4 = 00h
H1TC = 00h, H2TC = 00h

Transparent Operation on DS21Q50 for E1 Mode

Register Configurations:

RCR1 = 00h
CCR1 = 00h, CCR2 = 00h, CCR3 = 00h, CCR4 = 00h
CCR5 = 00h
TIR1 = 00h, TIR2 = 00h, TIR3 = 00h, TIR4 = 00h

Transparent Operation on DS2151, DS21Q41

Hardware Considerations:

TSER and TLINK must be tied together either logically or physically.

Register Configurations:

```
TCR1.2, TCR1.5, TCR1.6 = 1
TCR1.0, TCR1.1, TCR1.4 = 0
TCR2.0 = 0
TIR1, TIR2, TIR3 = 00h
CCR1.5 = 0
RMR1, RMR2, RMR3 = 00h
```

Transparent Operation on DS2153, DS21Q43

Hardware Considerations:

Need rev A5 or better for complete receive transparency with elastic store enabled (DS2153 only).

Register Configurations:

```
TCR1.6 = 1
TCR1.2, TCR1.3, TCR1.4, TCR1.5 = 0
CCR1.4 = 0
CCR2.3, CCR2.4, CCR2.5 = 0
TIR1, TIR2, TIR3, TIR4 = 00h
TCR2.1, TCR2.2, TCR2.3, TCR2.4, TCR2.5, TCR2.6, TCR2.7 = 0
RCR2.1 = 0 (required on rev A2 devices only)
```

In order to get transparent mode working on the devices DS26401, DS26521, DS26524 and DS26528, the customer should never set the RMMR and TMMR INIT_DONE bits to 1. Doing so will cause the framer to search for the framing pattern.

Transparent Operation on DS26401 for E1 Mode

Register Configurations:

```
RMMR = 81h
RCR1 = 22h, RCR2 = 00h
TMMR = 81h
TCR1= 80h, TCR2= 00h
```

Transparent Operation on DS26401 for T1 Mode

Register Configurations:

RMMR = 80h
RCR1= CAh, RCR2= 0Ch
TMMR = 80h
TCR1= 64h, TCR2= 00h, TCR3= 00h

Transparent Operation on DS26521, DS26524 and DS26528 for E1 Mode

Register Configurations:

RMMR = 81h
E1RCR1 = 22h, E1RCR2 = 00h, E1RCR3 = 00h
TMMR = 81h
E1TCR1= 80h, E1TCR2= 00h, TCR3 = 00h

Transparent Operation on DS26521, DS26524 and DS26528 for T1 Mode

Register Configurations:

RMMR = 80h
T1RCR1= CAh, T1RCR2= 0Ch
TMMR = 80h
T1TCR1= 64h, T1TCR2= 00h, TCR3= 00h

Conclusion

If you have further questions about transparent operation on Maxim framers or SCTs, contact the [Telecommunications Applications Support Team](#).

Related Parts

DS21352	3.3V DS21352 and 5V DS21552 T1 Single Chip Transceivers	
DS21354	3.3V/5V E1 Single Chip Transceivers (SCT)	
DS2152	Enhanced T1 Single Chip Transceiver	
DS2154	Enhanced E1 Single Chip Transceiver	
DS2155	T1/E1/J1 Single-Chip Transceiver	Free Samples
DS21552	3.3V DS21352 and 5V DS21552 T1 Single Chip Transceivers	
DS21554	3.3V/5V E1 Single Chip Transceivers (SCT)	Free Samples
DS21FF42	4 x 4 16 Channel T1 Framer / 4 x 3 12 Channel T1 Framer	

DS21FF44	4x3 Twelve Channel E1 Framer / 4x4 Sixteen Channel E1 Framer	
DS21FT42	4 x 4 16 Channel T1 Framer / 4 x 3 12 Channel T1 Framer	
DS21FT44	4x3 Twelve Channel E1 Framer / 4x4 Sixteen Channel E1 Framer	Free Samples
DS21Q352	Quad T1/E1 Transceiver (3.3V, 5.0V)	
DS21Q354	Quad T1/E1 Transceiver (3.3V, 5.0V)	
DS21Q42	Enhanced Quad T1 Framer	
DS21Q44	Enhanced Quad E1 Framer	
DS21Q50	Quad E1 Transceiver	
DS21Q55	Quad T1/E1/J1 Transceiver	
DS21Q55	Quad T1/E1/J1 Transceiver	
DS21Q554	Quad T1/E1 Transceiver (3.3V, 5.0V)	

More Information

For Technical Support: <http://www.maximintegrated.com/support>

For Samples: <http://www.maximintegrated.com/samples>

Other Questions and Comments: <http://www.maximintegrated.com/contact>

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