TFR0506LX

RC-type EMI filter with integrated ESD protection

Features

- EMI symmetrical (I/O) low-pass filter (6 channels)
- High efficiency in EMI filtering: -30 dB at frequencies from 900 MHz to 1.8 GHz
- Very low PCB space consumption:2.4mm x 1.5mm
- Very thin package: 0.55mm max
- High efficiency in ESD suppression (IEC 61000-4-2 level 4)
- Surge clamping voltage: 11.0V@4.0A
- High reliability offered by monolithic integration
- Lead-free package
- Each I/O pin can withstand over 1000 ESD strikes for ±25kV contact discharge

Applications

- LCD and camera for mobile phones
- SD Memory Card Interfaces
- Computers and printers
- Communication systems
- MCU boards

Mechanical Characteristics

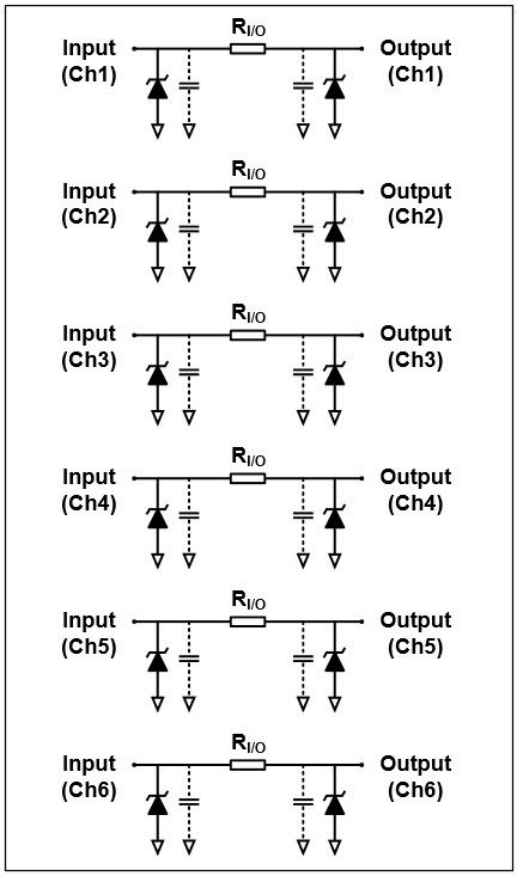
- Package: DFN2415-12L
- Marking: Part number
- Packaging: Tape and Reel
- ROHS compliant
- Moisture Sensitivity Level (MSL Level-1)

Description

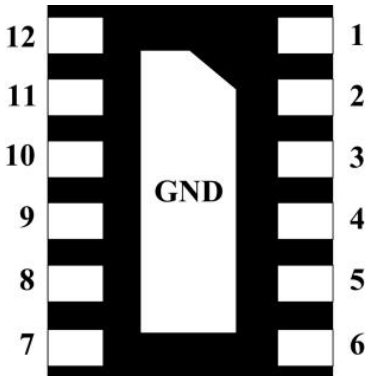
TFR0506LX is a 6-line, highly integrated device designed to suppress EMI /RFI noise in all systems exposed to electromagnetic interference.

This filter incorporates ESD &Surge protection circuitry , which prevents damage to the application when subjected to 8/20 μs surges up to 4.0A and ESD discharges up to 25kV on each I/O pin. It complies with IEC 61000-4-2 (ESD), Level 4 (±8kV contact, ±15kV air discharge).

Circuit Diagram



Pin Configuration



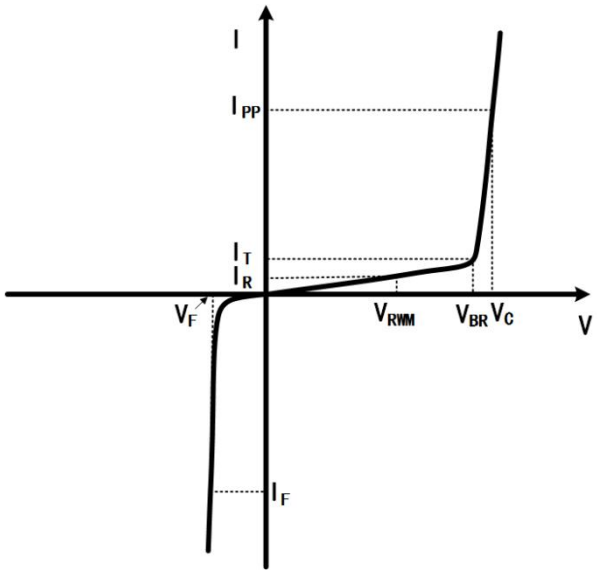
DFN2415-12L
(Bottom View)

DFN2415-12L
(Top View)

Absolute Maximum Rating

Symbol	Parameter	Value	Units
I_{PP}	Peak Pulse Current (8/20μs)	4.0	A
P_{PK}	Peak Pulse Power (8/20μs)	40	W
V_{ESD}	ESD per IEC61000-4-2 (Air) ESD per IEC61000-4-2 (Contact)	±25 ±25	kV
T_{OPT}	Operating Temperature	-55/+125	°C
T_{STG}	Storage Temperature	-55/+150	°C

Electrical Characteristics (T = 25℃)

Symbol	Parameter	Diagram
V_{RWM}	Nominal Reverse Working Voltage	
I_R	Reverse Leakage Current @ V_{RWM}	
V_{BR}	Reverse Breakdown Voltage @ I_T	
I_T	Test Current for Reverse Breakdown	
I_F	Forward Current	
V_F	Forward Voltage @ I_F	
I_{PP}	Maximum Peak Pulse Current	
V_C	Clamping Voltage @ I_{PP}	
C_{ESD}	Parasitic Capacitance	
R_{dyn}	Dynamic Resistance	
$R_{I/O}$	Series resistance between Input&Output	
α_{IL}	Insertion Loss	
f_{-3db}	Cut-off frequency at -3dB	

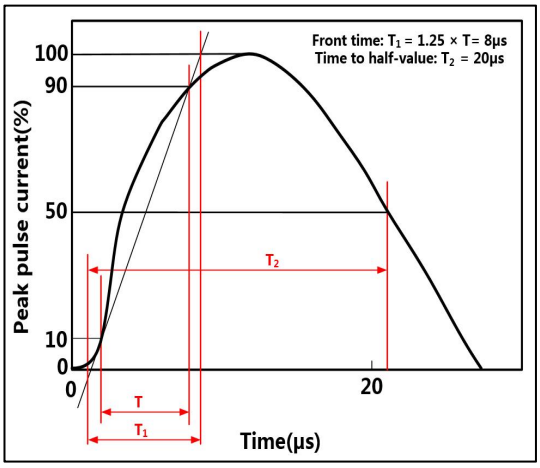
Symbol	Test Condition	Minimum	Typical	Maximum	Units
V_{RWM}				5.0	V
I_R	V_{RWM} = 5.0V, T = 25℃ Between I/O and GND		10	100	nA
V_{BR}	I_T = 1mA Between I/O and GND	5.5	7.7		V
V_F	I_F=1mA Between GND and I/O		0.85		V
V_C	I_{PP} = 4.0A, tp = 8/20μs Between IO and GND		11		V
V_C	I_{PP} = 8A, tp = 100ns(1) Between I/O and GND		10		V
	I_{PP} = 16A, tp = 100ns(1) Between I/O and GND		13		V

Symbol	Test Condition	Minimum	Typical	Maximum	Units
R_{dyn}	I_{PP} = 12.0A, tp = 100ns(1) Between I/O and GND		0.35		Ω
$R_{I/O}$	Between Input and Output		60		Ω
C_{ESD}	V_R = 0V, f = 1MHz Between I/O and GND		50		pF
a_{IL}	f = 0.9GHz~1.8GHz		-30		dB
f_{-3db}	a_{IL} = -3db Between Input and Output		0.1		GHz

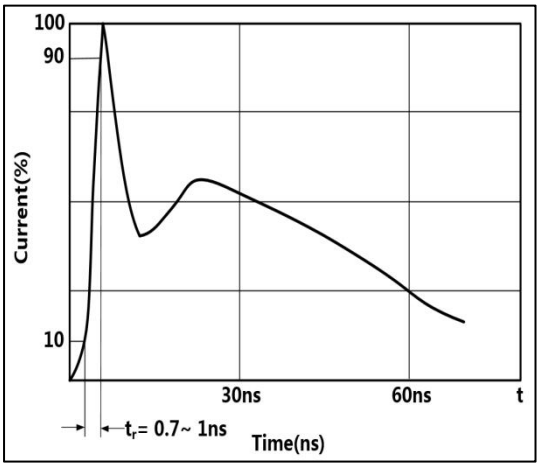
Notes:(1)Measurements performed using a 100ns Transmission Line Pulse(TLP) system.

Typical Performance Characteristic

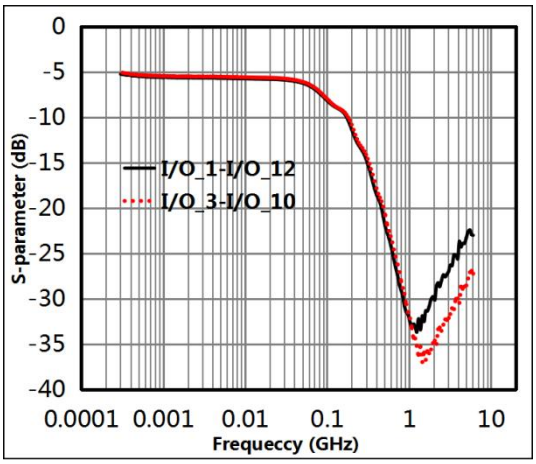
8/20μs surge waveform (IEC61000-4-5)



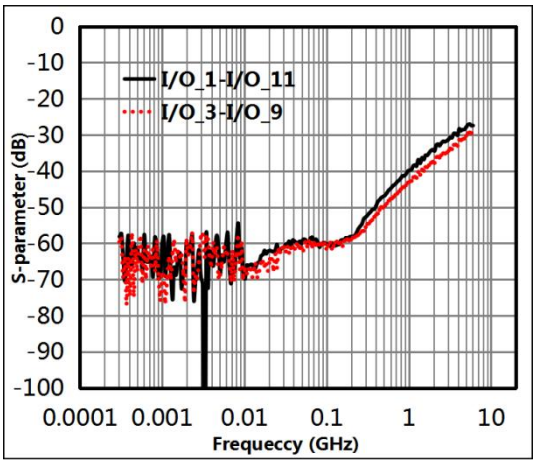
Contact discharge current waveform (IEC61000-4-2)



Insertion loss of Input to Output

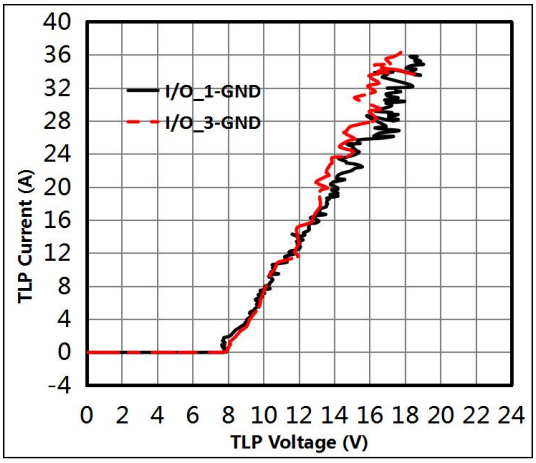


Analog cross talk of Input to Output

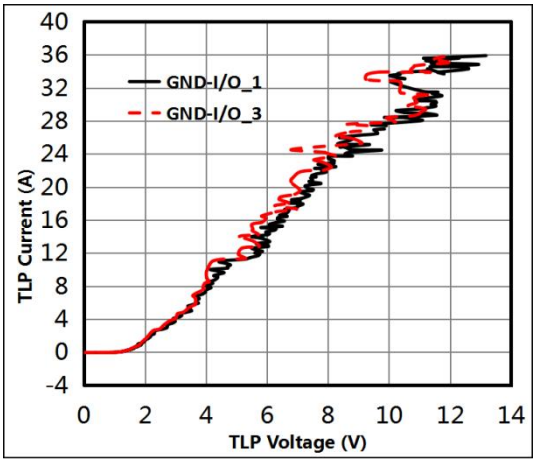


Typical Performance Characteristics

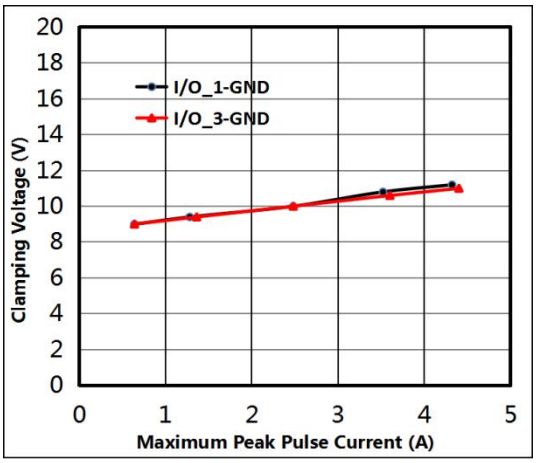
TLP Measurement of I/O to GND



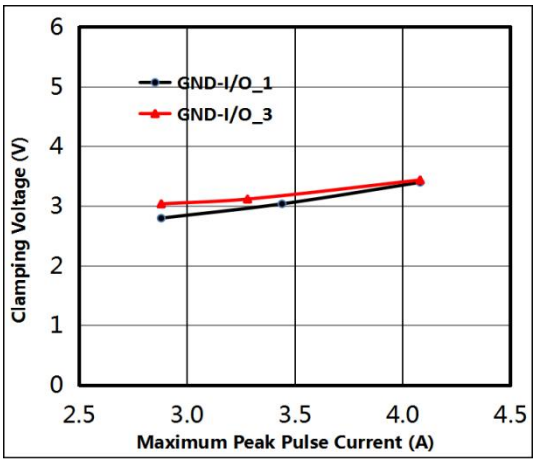
TLP Measurement of GND to I/O



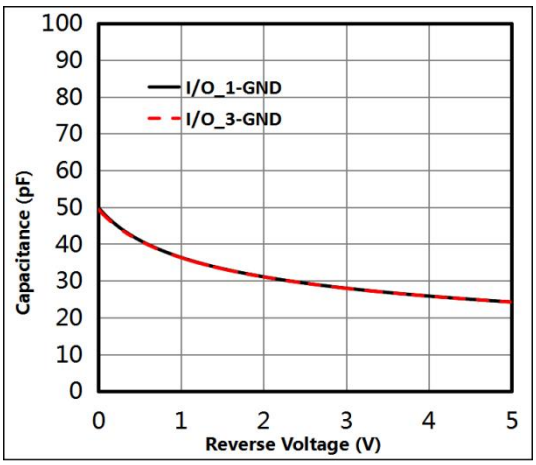
8/20us Current I/O to GND



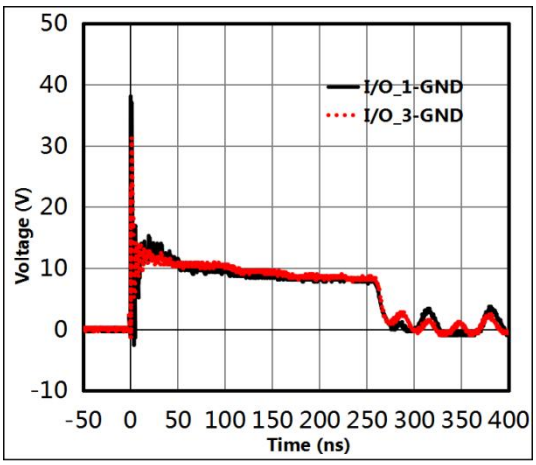
8/20us Current GND to I/O



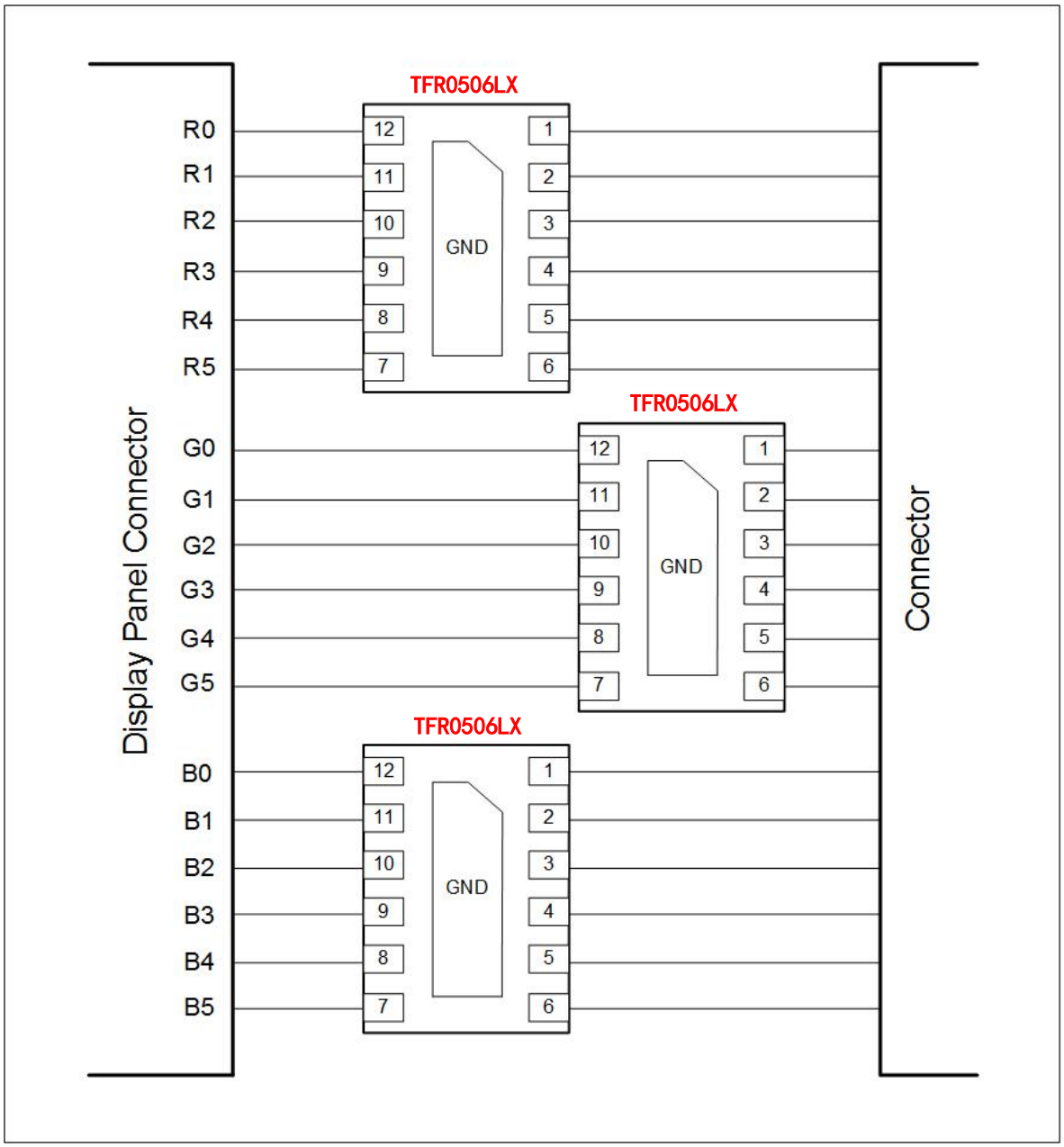
Capacitance vs Reverse Voltage of I/O to GND



+8kV Contact IEC Waveform of I/O to GND

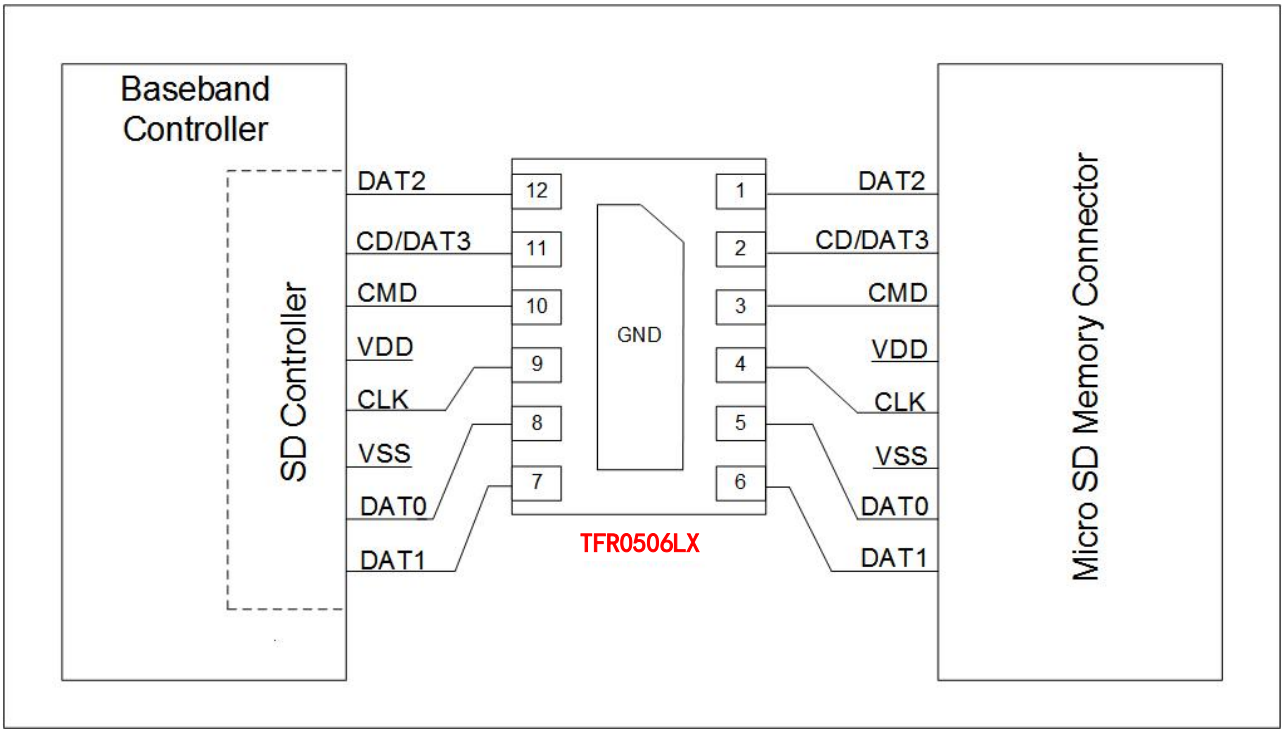


Application Information



Display Panel

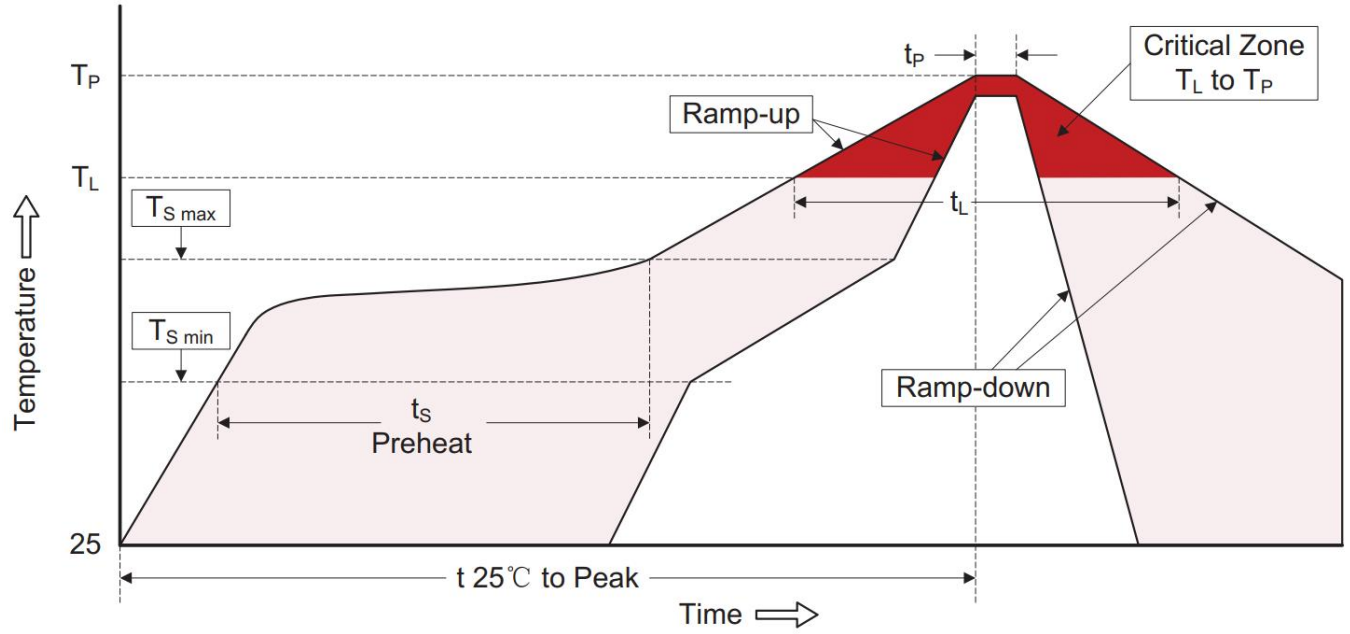
Application Information



Micro SD Memory

Recommended Soldering Conditions

Reflow Soldering

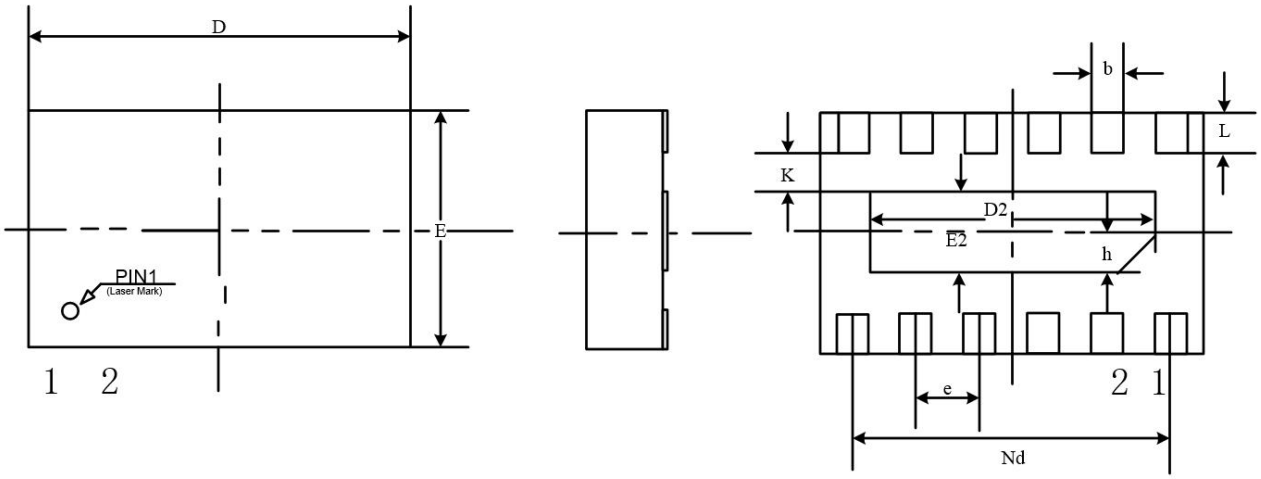


Recommended Conditions

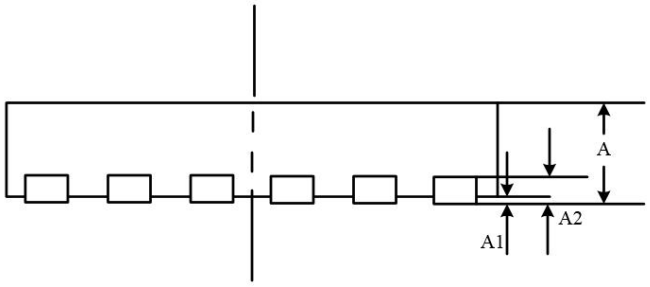
Profile Feature	Pb-Free Assembly
Average ramp-up rate (T_L to T_P)	3℃/second max
Preheat -Temperature Min ($T_{S\ min}$) -Temperature Max ($T_{S\ max}$) -Time (min to max) (ts)	 150℃ 200℃ 60-180 seconds
$T_{S\ max}$ to T_L -Ramp-up Rate	 3℃/second max
Time maintained above: -Temperature (T_L) -Time (t_L)	 217℃ 60-150 seconds
Peak Temperature (T_P)	260℃
Time within 5℃ of actual Peak Temperature (t_P)	20-40 seconds
Ramp-down Rate	6℃/second max
Time 25℃ to Peak Temperature	8 minutes max

Package Outline

- DFN2415-12L



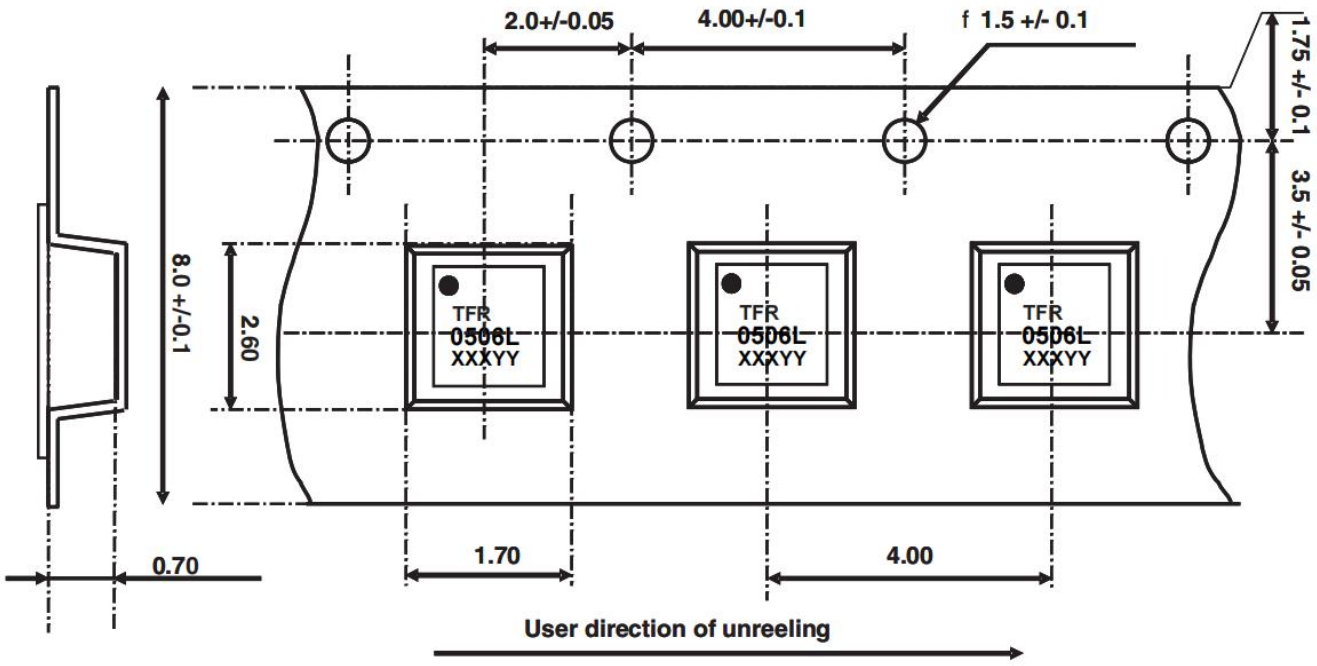
TOP VIEW SIDE VIEW BOTTOM VIEW



SIDE VIEW

Mechanical dimensions/mm			
SYMBOL	MIN	NOMINAL	MAX
A	0.45	0.5	0.55
A1	0	0.02	0.05
A2		0.127 REF	
b	0.15	0.2	0.25
D	2.3	2.4	2.5
D2	1.7	1.8	1.9
Nd		2.0 BSC	
e		0.4 BSC	
E	1.4	1.5	1.6
E2	0.4	0.5	0.6
L	0.2	0.25	0.3
h	0.2	0.25	0.3
K	0.2	0.25	0.3

Tape and Reel Specification



Marking Codes

Note:

(1) "TFR" is part number, fixed.

(2) "0506L" is part number, fixed.

(3) "XXXYY" is the identification number.

Ordering Information

Part Number	Working Voltage	Quantity Per Reel	Reel Size
TFR0506LX	5.0V	3,000	7 Inch

Ordering information scheme