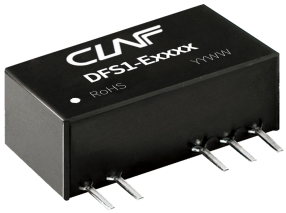
Descriptions

1W isolated, DC/DC Converter





RoHS

c UL us Report UL62368-1

CE Report EN62368-1

UKCA Report BS EN62368-1

Features

- Continuous short-circuit protection
- No-load input current as low as 8mA
- Operating ambient temperature range: -40℃ to +105℃
- High efficiency up to 85%
- I/O isolation test voltage 3k VDC
- Industry standard pin-out

Applications

- Industrial control
- Electricity
- Instrument

Selection Guide

Certification	Part No	Input Voltage (VDC)	Output		Full Load Efficiency (%) Min./Typ.	Capacitive Load①(μF) Max.
		Nominal (Range)	Voltage(VDC)	Current (mA) Max./Min.		
--	DFS1-E0303	3.3 (2.97-3.63)	±3.3	±150/±15	74/78	1200
	DFS1-E0305		±5	±100/±10	78/82	1200
	DFS1-E0309		±9	±56/±6	81/85	470
	DFS1-E0312		±12	±42/±5	78/82	220
	DFS1-E0315		±15	±34/±4	78/82	220
	DFS1-E0324		±24	±21/±2	80/84	100
EN/BS EN	DFS1-F0303		3.3	303/30	75/79	2400
UL/EN/BS EN	DFS1-F0305		5	200/20	78/82	2400
EN/BS EN	DFS1-F0309		9	111/11	81/85	1000
	DFS1-F0312		12	83/8	78/82	560
	DFS1-F0315		15	67/7	78/82	560
	DFS1-F0324		24	42/4	80/84	220
UL/EN/BS EN	DFS1-E0503	5 (4.5-5.5)	±3.3	±152/±15	70/74	1200
	DFS1-E0505		±5	±100/±10	78/82	1200
	DFS1-E0509		±9	±56/±6	79/83	470
	DFS1-E0512		±12	±42/±5	79/83	220
	DFS1-E0515		±15	±34/±4	79/83	220
	DFS1-E0524		±24	±21/±3	81/85	100
EN/BS EN	DFS1-F0503		3.3	303/30	70/74	2400

UL/EN/BS EN	DFS1-F0505		5	200/20	78/82	2400
EN/BS EN	DFS1-F0509		9	111/12	79/83	1000
	DFS1-F0512		12	84/9	79/83	560
	DFS1-F0515		15	67/7	79/83	560
UL/EN/BS EN	DFS1-F0524		24	42/4	81/85	220
EN	DFS1-F0909	9 (8.1-9.9)	9	111/12	77/81	470
UL/EN/BS EN	DFS1-E1203	12 (10.8-13.2)	±3.3	±152/±15	71/75	1200
	DFS1-E1205		±5	±100/±10	76/80	1200
	DFS1-E1209		±9	±56/±5	76/80	470
	DFS1-E1212		±12	±42/±5	77/81	220
	DFS1-E1215		±15	±34/±4	77/81	220
	DFS1-E1224		±24	±21/±2	76/80	100
EN/BS EN	DFS1-F1203		3.3	303/30	71/75	2400
UL/EN/BS EN	DFS1-F1205		5	200/20	76/80	2400
	DFS1-F1209		9	111/12	76/80	1000
	DFS1-F1212		12	83/9	76/80	560
EN/BS EN	DFS1-F1215		15	67/7	77/81	560
	DFS1-F1224		24	42/5	77/81	220
EN/BS EN	DFS1-E1505	15 (13.5-16.5)	±5	±100/±10	76/80	1200
	DFS1-E1509		±9	±56/±5	76/80	470
	DFS1-E1512		±12	±42/±5	76/80	220
	DFS1-E1515		±15	±34/±4	77/81	220
	DFS1-E1524		±24	±21/±2	77/81	100
	DFS1-F1505		5	200/20	76/80	2400
	DFS1-F1509		9	111/12	76/80	1000
	DFS1-F1512		12	83/9	76/80	560
	DFS1-F1515		15	67/7	77/81	560
	DFS1-F1524		24	42/5	77/81	220
UL/EN/BS EN	DFS1-E2403	24 (21.6-26.4)	±3.3	±150/±15	72/76	1200
	DFS1-E2405		±5	±100/±10	74/80	1200
	DFS1-E2409		±9	±56/±5	74/80	470
	DFS1-E2412		±12	±42/±5	75/81	220
	DFS1-E2415		±15	±34/±4	73/79	220
	DFS1-E2424		±24	±21/±2	74/80	100
EN/BS EN	DFS1-F2403		3.3	303/30	69/75	2400
UL/EN/BS EN	DFS1-F2405		5	200/20	73/79	2400
--	DS1-F2407		7.2	139/13	74/80	1000
EN/BS EN	DFS1-F2409		9	111/12	74/80	1000
UL/EN/BS EN	DFS1-F2412		12	83/9	75/81	560
EN/BS EN	DFS1-F2415		15	67/7	75/81	560
UL/EN/BS EN	DFS1-F2424		24	42/5	75/81	220

Note:
①The specified maximum capacitive load for positive and negative output is identical;
②Product images are for reference only; the actual product shall prevail.

Specifications

Product Specifications	Item	Operating Conditions		Min.	Typ.	Max.	Unit
Input Specifications	Input Current (full load / no-load)	3.3VDC input	3.3VDC output	--	384/10	405/--	mA
			other output	--	370/18	389/--	
		5VDC input	3.3VDC/5VDC output	--	270/8	286/--	
			9VDC/12VDC output	--	241/12	254/--	
			15VDC/24VDC output	--	241/18	254/--	
		9V input		--	137/8	144/--	
		12V input	3.3VDC output	--	112/8	118/--	
			5VDC/9VDC output	--	105/8	110/--	
			12VDC/15VDC output	--	103/8	109/--	
			24VDC output	--	105/8	110/--	
		15V input	5VDC/9VDC/12VDC output	--	84/8	88/--	
			15VDC/24VDC output	--	83/8	87/--	
		24V input	3.3VDC output	--	55/8	58/--	
			5VDC/9VDC/24VDC output	--	53/8	57/--	
			12VDC output	--	53/8	56/--	
			15VDC output	--	53/8	58/--	
	Reflected Ripple Current			--	15	--	
	Surge Voltage (1sec. max.)	3.3VDC input		-0.7	--	5	VDC
		5VDC input		-0.7	--	9	
		9VDC input		-0.7	--	12	
		12VDC input		-0.7	--	18	
		15VDC input		-0.7	--	21	
		24VDC input		-0.7	--	30	
	Input Filter			Capacitance filter			
	Hot Plug			Unavailable			
Output Specifications	Voltage Accuracy			See output regulation curve (Fig. 1)			
	Linear Regulation	Input voltage change: ±1%	3.3VDC output	--	--	1.5	%
			Other output	--	--	1.2	
	Load Regulation	3.3VDC input 10% -100% load	3.3VDC output	--	12	18	
			Other output	--	8	15	
		5VDC input 10% -100% load	3.3VDC output	--	15	20	
			5VDC output	--	10	15	
			9VDC output	--	8	10	
			12VDC output	--	7	10	
			15VDC output	--	6	10	
			24VDC output	--	5	10	
		9/12/15/24VDC input 10%-100% load	3.3VDC output	--	15	20	
			5VDC output	--	10	15	
			Other output	--	8	10	
	Ripple & Noise①	20MHz bandwidth	24VDC output	--	50	100	mVp-p

			Other output	--	30	75	
	Temperature Coefficient	Full load		--	±0.02	--	%/℃
	Short-circuit Protection			Continuous, self-recovery			
General Specifications	Isolation	Input-output electric strength test for 1 minute with a leakage current of 1mA max.		3000	--	--	VDC
	Insulation Resistance	Input-output resistance at 500VDC		1000	--	--	MΩ
	Isolation Capacitance	Input-output capacitance at 100kHz/0.1V		--	20	--	pF
	Operating Temperature	Derating requirements (see Fig. 2)		-40	--	105	℃
	Storage Temperature			-55	--	125	
	Case Temperature Rise	Ta=25℃		--	25	--	
	Pin Soldering Resistance Temperature②	Soldering spot is 1.5mm away from the case, 10 seconds max.		--	--	+300	
		Wave soldering, maximum 10 seconds		255	260	265	
	Storage Humidity	Non-condensing	3.3/5VDC input	--	--	95	%RH
			Other input	5	--	95	
	Vibration	9/12/15/24VDC input		10-150Hz, 5G, 0.75mm. along X, Y and Z			
	Switching Frequency	Full load, nominal input voltage	3.3VDC input	--	220	--	kHz
			5VDC input	--	270	--	
			9/12/15/24VDC input	--	260	--	
	MTBF	MIL-HDBK-217F @ 25℃		3500	--	--	k hours
Mechanical Specifications	Case Material	Black plastic, flame-retardant and heat-resistant (UL94V-0)					
	Dimension	19.65 x 6.00 x 10.16mm					
	Weight	2.1g(Typ.)					
	Cooling Method	Free air convection					

Note:
①The "parallel cable" method is used for Ripple and Noise test;
②The pin soldering temperature tolerance is not the actual temperature set by the soldering iron but the temperature required for proper solder joints. The actual temperature set by the customer should be determined comprehensively based on factors such as PCB thickness, copper coverage, soldering iron power, and soldering iron tip selection.

Electromagnetic Compatibility (EMC)

Emissions	CE	CISPR32/EN55032 CLASS B
	RE	CISPR32/EN55032 CLASS B
Immunity	ESD	IEC/EN61000-4-2 Air ±8kV, Contact ±6kV perf. Criteria B

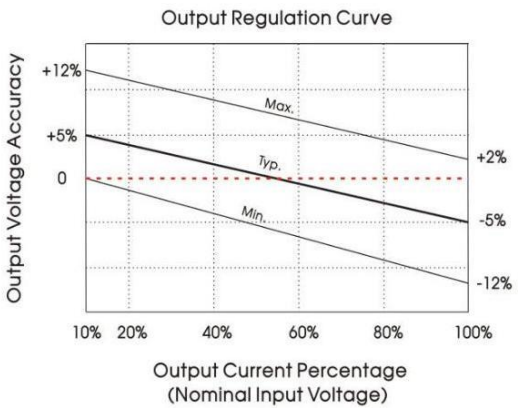
Note: Refer to Fig. 4 for recommended circuit test.

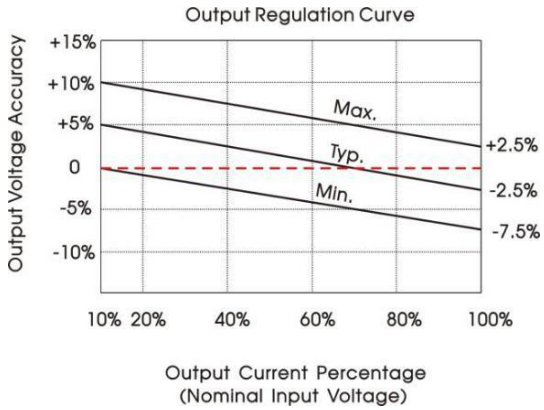
Typical Performance Curves

3.3VDC output

5VDC input

Other output





3.3/9/12/15/24VDC input

Other output

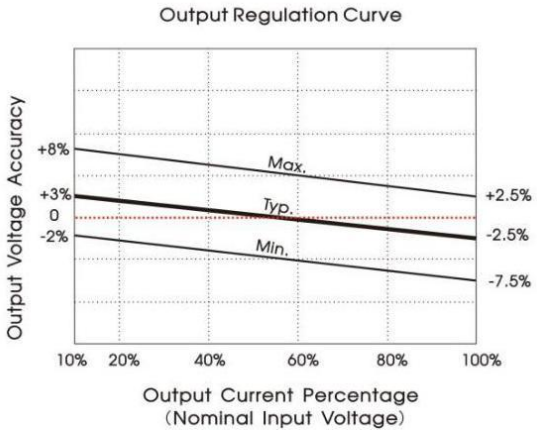
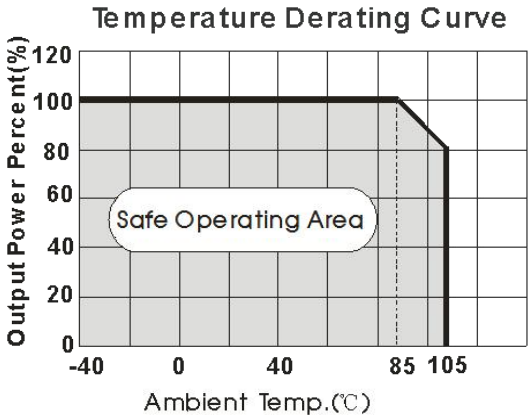


Fig. 1

5VDC input



3.3/9/12/15/24VDC input

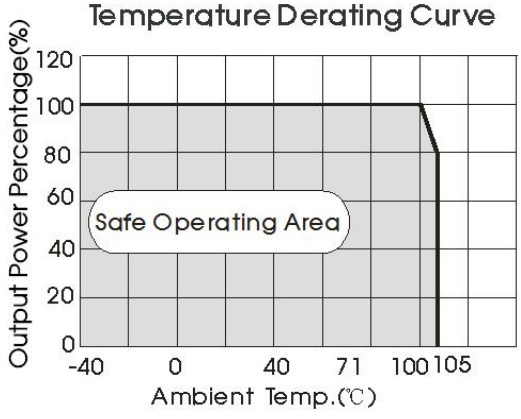
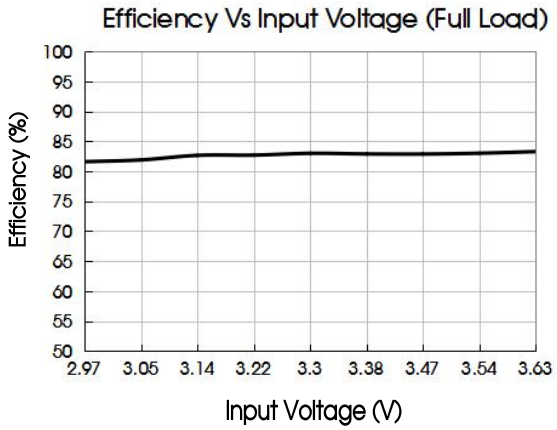
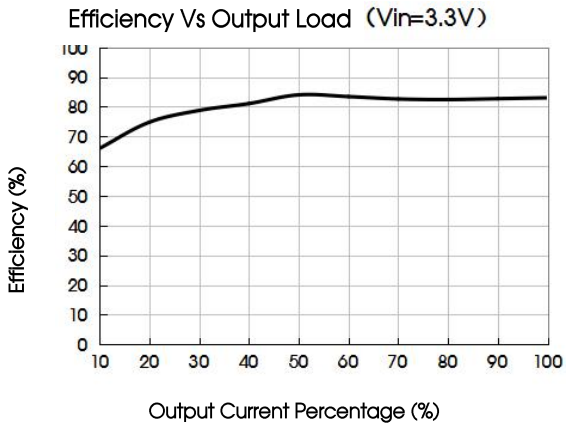


Fig. 2

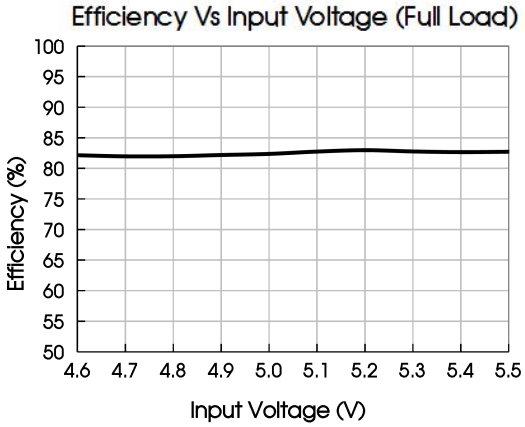
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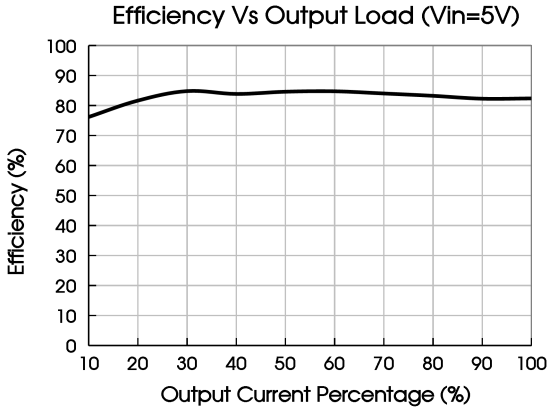
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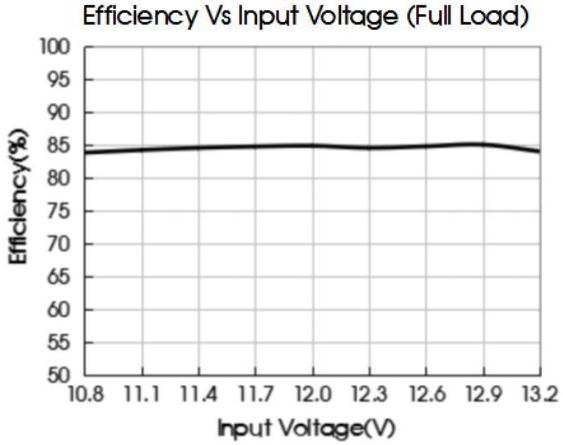
DFS1-E0505



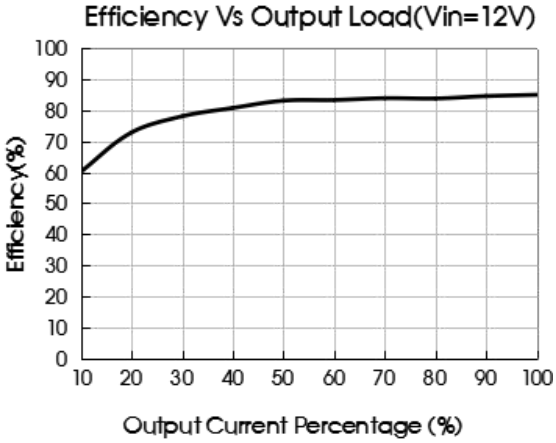
DFS1-E0505



DFS1-F1205



DFS1-F1205



Design Reference

1. Typical application

①Input and/or output ripple can be further reduced, by connecting a filter capacitor from the input and/or output terminals to ground as shown in Fig. 3.

②Choosing suitable filter capacitor values is very important for a smooth operation of the modules, particularly to avoid start-up problems caused by capacitor values that are too high. For recommended input and output capacitor values refer to Table 1.

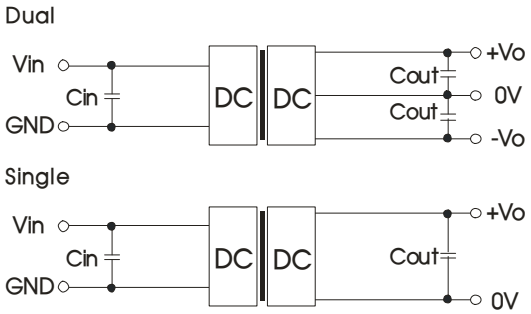


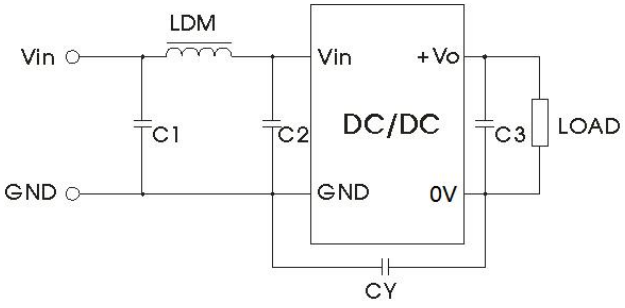
Fig. 3 Typical circuit diagram

Table 1: Recommended input and output capacitor values

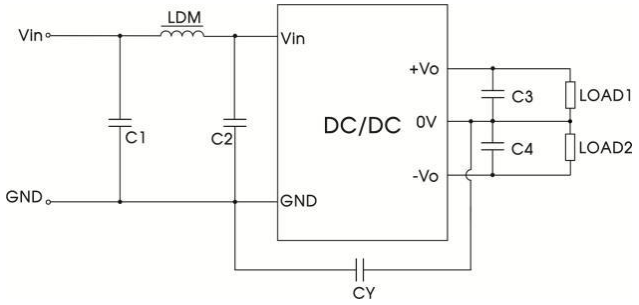
Vin	Cin	Single Vout	Cout	Dual Vout	Cout*
3.3VDC	10μF/16V	3.3VDC	10μF/16V	±3.3VDC	4.7μF/16V
5VDC	4.7μF/16V	5VDC	10μF16V	±5VDC	4.7μF/16V
9VDC	2.2μF/25V	7.2VDC	2.2μF/16V	±9VDC	1μF/16V
12VDC	2.2μF/25V	9VDC	2.2μF/16V	±12VDC	1μF/25V
15VDC	2.2μF/25V	12VDC	2.2μF/25V	±15VDC	0.47μF/25V
24VDC	1μF/50V	15VDC	1μF/25V	±24VDC	0.47μF/50V
--	--	24VDC	1μF/50V	--	--

2. EMC compliance recommended circuit

Single Output

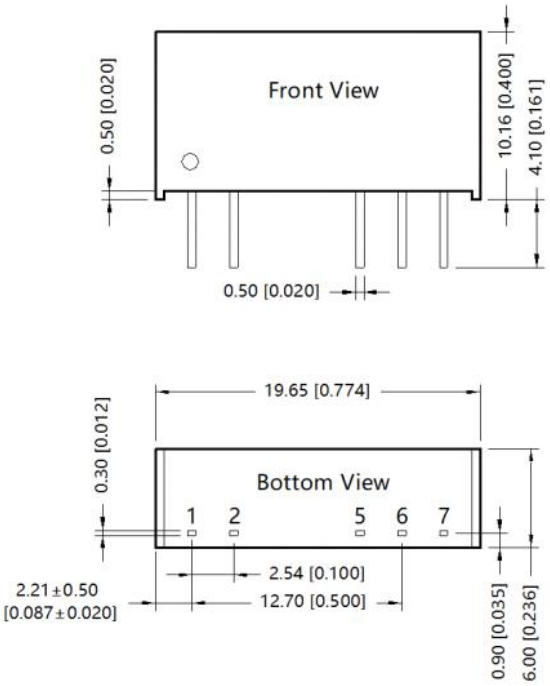


Dual Output



Input voltage		3.3VDC		5VDC		Other input
Output voltage		3.3/5VDC	9/12/15/24VDC	3.3/5/9VDC	12/15/24VDC	--
EMI	C1/C2	4.7uF/16V	4.7uF/16V	4.7uF/25V	4.7uF/25V	4.7uF/50V
	CY	--	270pF /4kVDC VISHAY HGZ102MBP TDK CD45-E2GA102M-GKA	100pF/4kV	1000pF/4kV	270pF /3kVDC
	C3/C4	Refer to the Cout in table 1				
	LDM	6.8μH				

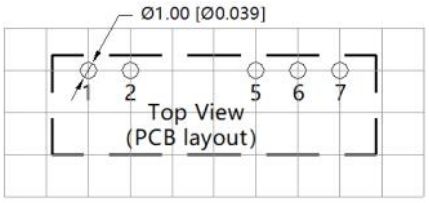
Dimensions and Recommended Layout



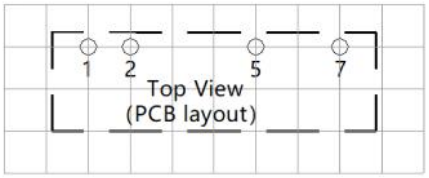
Note:
Unit: mm[inch]
Pin section tolerances: ±0.10[±0.004]
General tolerances: ±0.25[±0.010]

THIRD ANGLE PROJECTION

Duals Output



Singles Output



Note: Grid 2.54*2.54mm

Pin	Single	Dual
1	Vin	Vin
2	GND	GND
5	0V	-Vo
6	No Pin	0V
7	+Vo	+Vo

Notes:

1. If the product is not operated within the required load range, the product performance cannot be guaranteed to comply with all parameters in the datasheet;
2. The maximum capacitive load offered were tested at input voltage range and full load;
3. Unless otherwise specified, parameters in this datasheet were measured under the conditions of Ta=25℃, humidity<75%RH with nominal input voltage and rated output load;
4. All index testing methods in this datasheet are based on our company corporate standards;
5. Products are related to laws and regulations: see "Features" and "EMC";
6. Our products shall be classified according to ISO14001 and related environmental laws and regulations, and shall be handled by qualified units;
7. The image certification marks are for reference only; please refer to the selection table for actual specifications. Certification is based on the physical mark or packaging label.