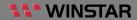
WS0010 vs WS0010-TX driver comparison



*** WINSTAR 華凌光電股份有限公司

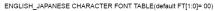


Instruction					C	Code					Description	Max. Execution Time when	
	RS	R/WB	DB7	DB6	DB5	DB4	DB3	DB2	DB1	DB0		fsp or fosc = 250KHz	
Clear Display	0	0	0	0	0	0	0	0	0	1	Clears entire display.	6.2ms	
Return Home	0	0	0	0	0	0	0	0	1	0	Sets DDRAM Address 0 into the Address Counter. Returns shifted display to original position. DDRAM contents remain unchanged. (DB0 is test pin. User should set DB0=0 all the time)	0	
Entry Mode Set	0	0	0	0	0	0	0	1	I/D	S	Sets cursor move direction and specifies display shift. (These operations are performed during data write and read.)	0	
Display ON/OFF Control	0	0	0	0	0	0	1	D	С	В	Sets entire Display (D) ON/OFF. Sets Cursor (C) ON/OFF. Sets Blinking (B) of Cursor Position Character.	0	
Cursor/ Display Shift/ Mode/ Pwr	0	0	0	0	0	1	S/C G/C	R/L PWR	0	0	Moves cursor & shifts display without changing DDRAM contents. Sets Graphic/Character Mode Sets internal power on/off	0	
Function Set	0	0	0	0	1	DL	N	F	FT1	FT0	Sets interface data length (DL). Sets number of display lines (N). Sets Character Font (F). Sets Font Table (FT) "Forbids to set FT=01 or 11 when IST0010 be operated in 4-bit interface.	0	
Set CGRAM Address	0	0	0	1	ACG	ACG	ACG	ACG	ACG	ACG	Sets CGRAM Address. CGRAM data is sent and received after this setting.	0	
Set DDRAM Address	0	0	1	ADD	ADD	ADD	ADD	ADD	ADD	ADD	Sets DDRAM Address. The DDRAM data Is sent and received after this setting.	0	
Read Busy Flag & Address	0	1	BF	AC	AC	AC	AC	AC	AC	AC	Reads Busy Flag (BF) indicating that internal operation is being performed. Reads Address Counter contents.	0	
Write data into the CGRAM or DDRAM	1	0	7	ı	I	Wri	ite Data	1	ı	1	Writes data into the CGRAM or DDRAM	0	
Read Data from the CGRAM or DDRAM	1	1	Read Data Read data from the CGRAM or DDRAM							0			

The same

CHARACTER GENERATOR ROM (CGROM)





Upper 4bit ower 4bit	ш	LLLH	LLHL	LLHH	LHLL	LHLH	LHHL	LHHH	HLLL	HLTH	HLHL	HLHH	HHLL	HHLH	HHHL	нннн			
ш	CG (1)	×		0	0	P		Ħ	1	×			9	Ħ	œ	Ħ			
LLLH	CG RAM (2)	=	ı	1	A	Q	ä	*		*	•	P	*	4	ä	9			
LLHL	CO RAM (3)	A	•	2	B	R	Ь	r	w	u	Г	×	**	×	p	8			
LLHH	CO RAM (4)	I	#	4		5	ø		71		¥	P	Ŧ	Ħ	8.	00			
UHLL	CO RAM (5)	П	#	4	D	T	đ	t.	=	25		H	ŀ	ħ	μ	•			
LHLH	CC RAM (4)	ı	×	۵	E	u	ø	w	×	Å	H	×	*	1	Œ	ü			
LHHL	CC RAN (7)	×	8.	6	F	Ų	f	W	×	M	7	Ħ		Ħ	ρ	X			
LHHH	CO RAM (8)	П	*	T	8	W	9	w	P	×	7	#	×	Ŧ	9	M			
HLLL	CG RAM (1)	ш	ĸ	8	H	×	h	×	ı	ю.	*	7	×	IJ	×	×			
HLLH	CG RAM (2)		X	9	I	¥	i	¥	w	ĸ.	'n	*	X	ı	••	ч			
HLHL	CG RAM (3)	п	*	Ħ	J	Z	ä	×	п	*	*	7	ň	v	j	¥			
HLHH	CG RAM (4)	Ħ	ŧ	ŧ	K	I	k	ı	4		7	*	Н	П	×	{\		C	2
HHLL	CG RAM (\$)	7	*		L	¥	1	ı	÷	ü	۳	n	7	Ŧ	1		ne	3	7
HHLH	CG RAM (4)				M	1	£	ì	×	-	7	ĸ	•	¥	##				
HHHL	CC RAM (F)	P	•	H	Н		n	Ħ	шш	*	3	Ľ	ı.		ñ				
нини	CG RAM (I)	1		Ŧ	0		ø	٠	÷	n	•••	7	*	٦	ö				

WESTERN	FUROPEAN	CHARACTER	FONT TABLE	= I (FT[1:0]=01)

Upper 4hit Luver 4hit	ш	LLLH	LLHL	LLHH	LHLL	LHLH	LHHL	LHHH	HLLL	HLTH	HLHL	HLHH	HHLL	HHLH	HHHL	нн
ш	CG PAUL (1)			Ø	9	P	ı	P	O	Ê			ø		œ	ı
Ш	CG RAM (2)		ı	1	A	0	Ħ	•	ů		ı				ă	
LLHL	B RAM (3)			M	æ	Œ	Ð	£	•	Ħ	*	×	₽		X	
LLHH	8 RAM (4)		#	M		M	Ü				•					
LHLL	CO RAM (\$)		#	4	D	T	7	¥	ű							CID COLUMN
LHLH	CG RAM (§)		×	Ю	E	₽	0	3	3	ě	i		B			Ì
LHHL	CG RAM (7)		8.	6	F	V	ľ	v	3		×				P	
LHHH	CC RAM (\$)			r	8	W	9	*	٥		×			*		
HLLL	80 RAM (1)		٤	80	H	×	Ħ	ж	80	Ħ				*		
HLLH	CG RAM (2)		¥	9	I	¥	ı	*	Ó	Ä			ø		₽	
HLHL	CG RAM (3)		*	i	J	Z	ď	×	9		•		9			
HLHH	CG RAM (4)		۰	×	K	I	k	×					Ħ			
HHLL	CO RAM (8)			ĸ	Щ	¥	1	ı	ð		*		•		¥,	
HHLH	CO RAM (f)			#	m	7	m	¥	Ю	ä	3	H	×			l
HHHL	CG RAM (7)			þ	Н	^	m	*	ö	ä			õ	I	HO	
нини	CO RAM (8)		×	P	0		0	*	×		H	1	8		Ш	

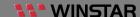
WESTERN EUROPEAN CHARACTER FONT TABLE II (FT[1:0]=11)

STERN EUF	ROP	=AN	CHA	RAC	TEF	R FO	NT 1	ABL	ΕII	E II (FT[1:0]=11)						
Upper 4bit Lower 4bit	ա	LLLH	LLHL	LLHH	LHLL	LHLH	LHHL	LHHH	HLLL	HLLH	HLHL	HLHH	HHLL	HHLH	HHHL	***
ш	CG RAM (1)	#		ø	œ	P		P	Ŧ	É	ä		r	H	ß	ĸ
шя	CG RAM (2)		ı	1	Ĥ	Q		4	ü	æ	¥		J	Ŧ	¥	W
LLHL	CG #AN (7)	Ţ	•	2	B	R	b	r	é	Æ	Ð	۰	œ	8	90	×
LLHH	CG RAN (4)	L	#	3	0	8	Œ	W	ä	8	3	×	P	1	Œ	4
LHIL	CO RAM (5)	ľ	#	4	D	T	d	*	ä	ä	Œ	×	#	П	8	œ
LHLH	CG ITANI (4)	Į	×	5	E	U	8	u	à	ä	£	ų	Ť	4	m	7
LHHL	CG RAN (7)	ì	8.	6	H	Ų	Ť	v	å	ű	¥	١,	4	8	Θ	۲
LHHH	CG RAM (8)	Į	*	7	G	W	=	w	9	ù	R	×	Ť	٨	×	
HLLL	CG RAM (1)	ľ	ĸ.	8	H	×	h	ж	ê	9	£	×	٠	Ξ	ĸ	F
HLTH	(2)	l	×	9	I	¥	i	7	ë	Ø	i	×	П	I	A	ŧ
HLHL	CO RAM (3)	æ	*	ı	J	Z	ď	×	è	ű	×	×	П	X	μ	F
ne	CG RAN (4)	ľ	*	ŧ	K	E	k	×	ï	Ħ	31	*	L	T	V	Ħ
HHLL	CC RAN (1)		•	K	L	١.	1	I	î	ñi	8	*		4	K	
HHLH	CG RAM (¢)	•••			M	1	m	¥	ì		8	#	•	Ψ	π	
HHHL	CG IFANI (7)	2		ř	H	m	n	*	Ä	9	8	Ŧ	(3	Ω	P	E
***	CG RAN (F)	3	×	Ŧ	0		ø	Δ	Å	ě.	ø		(8	α	a	E

ENGLISH_RUSSIAN CHARACTER FONT TABLE(FT[1:0]=10)

Upper 4bit	ա	LLLH	LLHL	LLHH	LHLL	LHLH	LHHL	LHHH	HLLL	HLLH	HLHL	HLHH	HHLL	HHLH	HHHL	нн
ш	CG RAH (1)	Å		Ø	0	B		Ħ	Ð	à	В	Ю	Н		4	k
LLLIM	CG RAJI (2)	Á	ı	1			M			¥Ø,		Я	ш	ı	Ш	H
LLHL	CG RAM (3)	Ä				R	B		ð	48	ш	10	1	¥	Щ	H
LLHH	CG RAH (4)	Ħ	Ħ				ø		Ó	m	*	B	ы	×	Ħ	3
LHLL	CG RAH (5)	Ä	#	Ħ	D				80	Ħ	m		H	×	*	ŧ
THTH	CO RAM (4)	Å					1		Ш	40	T	10		×	Щ	ī
LHHL	CG RAH (7)	Æ				W	۹.		10	*	8	×	ю	*	Щ	A
LHHH	CG RAH (8)	Ŧ		M		W	9	w	×	9	Л	×	7	I		I
HLLL	CG RAM (1)	È	K	8	H	×	h	×	*	è	П	И	**			1
HLLH	CG RAH (2)	É	×	9		¥	1		Ď	100	2	ă	*	*		i
HLHL	CG RAH (F)	Ê	**			X			ð	ê	8	×	**	#	Ħ	i
HLHH	CG RAM (4)	Ë			K		ж			10	#	Ŗ	•••	H	•	i
HHLL	CG RAM (5)	Ì					1			*	Ш	×	14	Ħ	ij	ž
HHLH	CG RAH (6)	Í					m		¥	Ĭ	В	H	ě			Š
HHHL	CG RAH (7)	Î					ø	7	ш	**	3	П	£	Ħ		9
нини	CO RAM (4)	ï							B	ï	3	Ť	É	i	•	

Electrical & Optical Characteristics





Integrated Solutions Technology

IST0010-TX

ABSOLUTE MAXIMUM RATING

Parameter	Symbol	Rating	Unit
Supply voltage range	VCC/VCCB	- 0.3 to +6.5	٧
Supply voltage range	V16	-0.3 to +19.0	٧
Input voltage range	VIN	-0.3 to VCC + 0.3	٧
Operating temperature range	Topr	-30 to +80	°C
Storage temperature range	Tstr	-55 to +125	°C

1. VCC/VCCB and V16 are based on VSS/VSSB = 0V

2. If supply voltage exceeds its absolute maximum range, this LSI may be damaged permanently. It is desirable to use this LSI under electrical characteristic conditions during general operation. Otherwise, this LSI may malfunction or reduced LSI reliability may result.



Integrated Solutions Technology

IST0010-TX

The same

DC CHARACTERISTICS

(GND = 0V, VCC = 2.7 to 5.5V, Ta = -30 to +80°C)

Item		Symbol	Condition	Min.	Тур.	Max.	Unit	Pin used
Operating Vo	oltage	VCC		2.7	-	5.5	٧	VCC
Operating Vo	oltage	V16		-	-	16	٧	V16
Input voltage	High	ViH		0.8 VCC	-	VCC	v	*1
input voitage	Low	VIL		-	-	0.2 VCC	ľ	'
Output	High	Vон	Iон = -0.5mA	0.8 VCC	-	VCC	V	*2
voltage	Low	Vol	IoL = 0.5mA	-	-	0.2 VCC	V	-2
Input leakage	nput leakage current		VIN = VCC or GND	-1		1	μΑ	*1
Oscillator		fosc	Rf=60K (*4)	400		800	KHz	OS1,OSC2
frequency		1030	Rf=75K (*4)	370	I -/	780	KIIZ	031,0302
High level se output curr		ISEGOH	VSEGOH=14V	-30	1.0	-300	μА	SEG1~100
High level se output curr toleranc	ent	ITOL	VSEGOH=14V		-	±6	%	SEG1~100
Low level cor sink curre		ICOMOL	VCOMOL=0.4V	15	-	-	mA	COM1~16
DC-DC converter output voltage		V16	1	-	-	16	٧	V16
Standby current		Istd	(*3)	-	-	30	uA	VCC
Operating current		IVcc	VCC=3.3V, fosc=530kHz No loading External V16	-	-	330	uA	VCC

[Notes]
*1: MS,LAT,CL,D,SHL,CSB,DB7~DB0,RESETB,RS,R_WB,E,PS,C86

- *2: LAT,CL,D, DB7~DB0
- *3: When MS,PS and C68 = "H"(VCC),OSC=OFF,VCC=3.3V
- *4: When VCC=2.7V & VCC=5.5V





Integrated Solutions Technology

IST0010

ABSOLUTE MAXIMUM RATING

Parameter	Symbol	Rating	Unit
Supply voltage range	VCC/VCCB	- 0.3 to +6.5	V
Supply voltage range	V16	-0.3 to +19.0	٧
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Operating temperature range	Topr	-30 to +80	°C
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IST0010

DC CHARACTERISTICS

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Item		Symbol	Condition	Min.	Тур.	Max.	Unit	Pin used
Operating Vo	oltage	VCC		2.7	-	5.5	٧	VCC
Operating Vo	oltage	V16		-	-	16	٧	V16
land a selfana	High	ViH		0.8 VCC	-	VCC	<	*1
Input voltage	Low	VIL		-	-	0.2 VCC	\ \	-1
Output	High	Vон	Iон = -0.5mA	0.8 VCC	-	VCC	v	•
voltage	Low	Vol	IoL = 0.5mA	-	-	0.2 VCC	V	*2
nput leakage current		IIL\IIH	VIN = VCC or GND	-1		1	μА	*1
Oscillator frequency		fosc -	Rf=60K (*4)	400	-	800	KHz	OS1,OSC2
		losc -	Rf=75K (*4)	370	-	780	KHZ	051,0502
High level se output cun		ISEGOH	VSEGOH=14V	-30	7-	-300	μА	SEG1~100
High level se output cur tolerand	rent	ITOL	VSEGOH=14V		-	±6	%	SEG1~100
Low level cor sink curre		ICOMOL	VCOMOL=0.4V	15	-	-	mA	COM1~16
DC-DC converter output voltage		V16		-	-	16	٧	V16
Standby current		Istd	(*3)	-	-	30	uA	VCC
Operating current		IVcc	VCC=3.3V, fosc=530kHz No loading External V16	-	-	330	uA	VCC

- [Notes]
 *1: MS.LAT,CL,D,SHL,CSB,DB7-DB0,RESETB,RS,R_WB,E,PS,C86
- *2: LAT,CL,D, DB7-DB0
 *3: When MS,PS and C68 = "H"(VCC),OSC=OFF,VCC=3.3V
- *4: When VCC=2.7V & VCC=5.5V









100% 50% 0%

- New IC's CGROMs is the same as old IC.
- New IC's functions are the same as old IC.
- New IC's characteristics is the same as old IC.
- New IC can switch with old IC, regarding the module spec still keep the same.

THANK YOU FOR LISTENING

謝謝 Danke Dziękuję 감사합니다 Merci Благодарим Вас Gracias ευχαριστω Dank u ありがとう Obrigado



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Responsibility on Environmental Protection

Winstar considered that our responsibility on environmental protection; our manufacturing process completely follows RoHS, SVHC of EU REACH and WEEE standard since 2006, as well as our relative supplier was asked to be cooperated with same regulation.