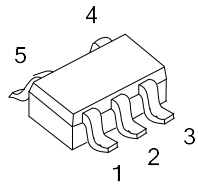
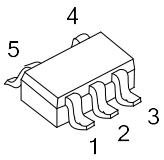
88CXX

CMOS IC

BUILT-IN DELAY CIRCUIT HIGH-PRECISION VOLTAGE DETECTOR



SOT-25
(JEDEC MO-178)



SOT-23-5
(JEDEC TO-236)

■ DESCRIPTION

The UTC **88CXX** series are highly accurate, low power consumption voltage detector, manufactured using CMOS process. The detection voltage is fixed internally, with an accuracy of ±2.0%. Besides, UTC **88CXX** can easily delay a release signal by attachment of an external capacitor with built-in delay circuit.

■ FEATURES

* ±2.0 % Accuracy Detection Voltage
* Hysteresis characteristics: 5% typ.
* Detection voltage ranges from 1.8V to 4.5V with 0.1V step.
* Delay time setting by an additional external capacitor
* Push-Pull $\overline{\text{RESET}}$ Active Low Output

■ ORDERING INFORMATION

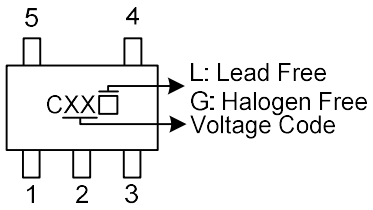
Ordering Number		Package	Packing
Lead Free	Halogen Free		
88CXXL-AE5-R	88CXXG-AE5-R	SOT-23-5	Tape Reel
88CXXL-AF5-R	88CXXG-AF5-R	SOT-25	Tape Reel

88CXXG-AF5-R

(1)Packing Type
(2)Package Type
(3)Green Package
(4)Output Voltage Code

(1) R: Tape Reel
(2) AE5: SOT-23-5, AF5: SOT-25
(3) G: Halogen Free and Lead Free, L: Lead Free
(4) XX: refer to Marking Information

■ MARKING INFORMATION

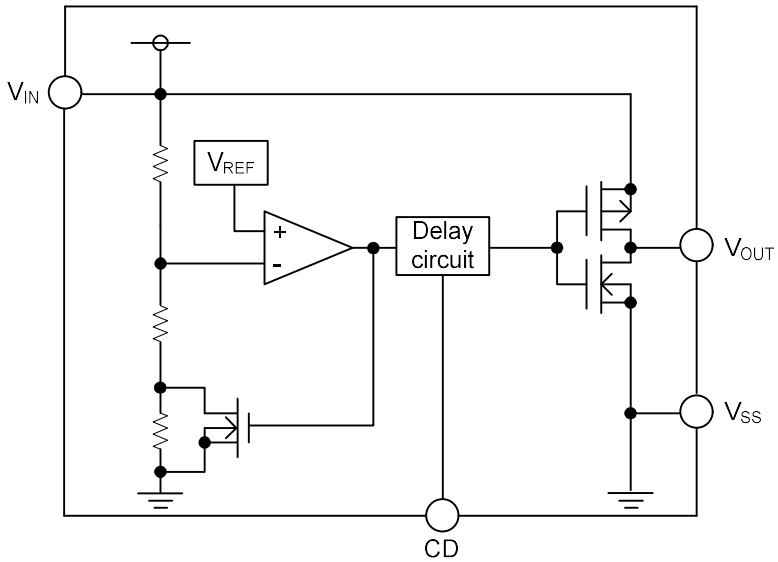
PACKAGE	VOLTAGE CODE		MARKING
SOT-25 SOT-23-5	18: 1.8V 19: 1.9V 20:2.0V 21:2.1V 22:2.2V 23:2.3V 24:2.4V 25:2.5V 26:2.6V 27:2.7V 28:2.8V 29:2.9V 30:3.0V 31:3.1V	32:3.2V 33:3.3V 34:3.4V 35:3.5V 36:3.6V 37:3.7V 38:3.8V 39:3.9V 40:4.0V 41:4.1V 42:4.2V 43:4.3V 44:4.4V 45:4.5V	

■ PIN CONFIGURATION

PIN NO.	PIN NAME	DESCRIPTION
1	V_{OUT}	Voltage Detection Output Pin
2	V_{DD}	Voltage Input Pin
3	V_{SS}	GND Pin
4	NC	No Connection (Note)
5	C_D	Connection Pin For Delay Capacitor

Note: The NC pin is electrically open and can be connected to V_{DD} or V_{SS}.

■ BLOCK DIAGRAMS



■ ABSOLUTE MAXIMUM RATINGS (T_A=25°C, unless otherwise specified.)

PARAMETER	SYMBOL	RATINGS	UNIT
Power Supply Voltage	V_{DD}-V_{SS}	12	V
C_D Terminal Input Voltage	V_{CD}	V_{SS}-0.3 ~ V_{DD} +0.3	V
Output Voltage	V_{OUT}	V_{SS}-0.3 ~ V_{DD}+0.3	V
Output Current	I_{OUT}	50	mA
Power Dissipation	P_D	250	mW
Operating Temperature	T_{OPR}	-40 ~ +85	°C
Storage Temperature	T_{STG}	-40 ~ +150	°C

Note: Absolute maximum ratings are those values beyond which the device could be permanently damaged. Absolute maximum ratings are stress ratings only and functional device operation is not implied.

■ ELECTRICAL CHARACTERISTICS (T_A=25°C, unless otherwise specified.)

Detection voltage (1.8 ~ 2.6V)

PARAMETER	SYMBOL	TEST CONDITONS		MIN	TYP	MAX	UNIT
Detect Voltage	V_{DET}			$-V_{DET}$ ×0.98	$-V_{DET}$	$-V_{DET}$ ×1.02	V
Hysteresis Range	V_{HYS}			$-V_{DET}$ ×0.02	$-V_{DET}$ ×0.05	$-V_{DET}$ ×0.08	V
Supply Current	I_{SS}	V_{DD}=3.5V			1.2	5.0	μA
Operating Voltage	V_{DD}			0.95		10.0	V
Output Current	I_{OUT}	N-CH V_{DS}=0.5V	V_{DD}=1.20V	0.23	0.50		mA
		P-CH V_{DS}=0.5V	V_{DD}=4.8V	0.36	0.62		mA
Detect Voltage Temperature Characteristics	$\frac{\triangle V_{DET}}{\triangle T_{OPR} \times V_{DET}}$				±100		ppm/°C
Delay Time	t_{DLY}	V_{DD}=3.5V, C_D=4.7nF		16	30	42	ms

ELECTRICAL CHARACTERISTICS (Cont.)

Detection voltage (2.7V ~ 3.9V)

PARAMETER	SYMBOL	TEST CONDITONS		MIN	TYP	MAX	UNIT
Detect Voltage	V_{DET}			$-V_{DET}$ ×0.98	$-V_{DET}$	$-V_{DET}$ ×1.02	V
Hysteresis Range	V_{HYS}			$-V_{DET}$ ×0.02	$-V_{DET}$ ×0.05	$-V_{DET}$ ×0.08	V
Supply Current	I_{SS}	V_{DD}=4.5V			1.3	5.0	μA
Operating Voltage	V_{DD}			0.95		10.0	V
Output Current	I_{OUT}	N-CH V_{DS}=0.5V	V_{DD}=1.20V	0.23	0.50		mA
			V_{DD}=2.40V	1.60	3.70		mA
		P-CH V_{DS}=0.5V	V_{DD}=4.8V	0.36	0.62		mA
Detect Voltage Temperature Characteristics	$\frac{\triangle V_{DET}}{\triangle T_{OPR} \times V_{DET}}$				±100		ppm/°C
Delay Time	t_{DLY}	V_{DD}=4.5V, C_D=4.7nF		12	28	34	ms

Detection voltage (4.0V ~ 4.5V)

PARAMETER	SYMBOL	TEST CONDITONS		MIN	TYP	MAX	UNIT
Detect Voltage	V_{DET}			$-V_{DET}$ ×0.98	$-V_{DET}$	$-V_{DET}$ ×1.02	V
Hysteresis Range	V_{HYS}			$-V_{DET}$ ×0.02	$-V_{DET}$ ×0.05	$-V_{DET}$ ×0.08	V
Supply Current	I_{SS}	V_{DD}=6.0V			1.5	5.0	μA
Operating Voltage	V_{DD}			0.95		10.0	V
Output Current	I_{OUT}	N-CH V_{DS}=0.5V	V_{DD}=1.20V	0.23	0.50		mA
			V_{DD}=2.40V	1.60	3.70		mA
		P-CH V_{DS}=0.5V	V_{DD}=6.0V	0.46	0.75		mA
Detect Voltage Temperature Characteristics	$\frac{\triangle V_{DET}}{\triangle T_{OPR} \times V_{DET}}$				±100		ppm/°C
Delay Time	t_{DLY}	V_{DD}=7.0V, C_D=4.7nF		12	17	34	ms

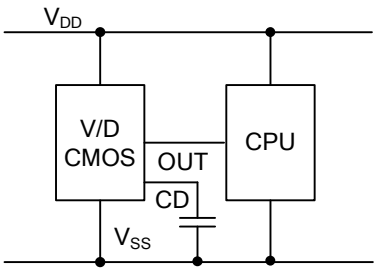
■ DECTECTION VOLTAGE RANGE vs. HYSTERESIS WIDTH

DETECTION VOLTAGE RANGE (V)	HYSTERESIS WIDTH V_{HYS} TYP (V)	DETECTION VOLTAGE RANGE (V)	HYSTERESIS WIDTH V_{HYS} TYP (V)
1.8V±2.0%	0.090	3.2V±2.0%	0.160
1.9V±2.0%	0.095	3.3V±2.0%	0.165
2.0V±2.0%	0.100	3.4V±2.0%	0.170
2.1V±2.0%	0.105	3.5V±2.0%	0.175
2.2V±2.0%	0.110	3.6V±2.0%	0.165
2.3V±2.0%	0.115	3.7V±2.0%	0.185
2.4V±2.0%	0.120	3.8V±2.0%	0.190
2.5V±2.0%	0.125	3.9V±2.0%	0.195
2.6V±2.0%	0.130	4.0V±2.0%	0.200
2.7V±2.0%	0.135	4.1V±2.0%	0.205
2.8V±2.0%	0.140	4.2V±2.0%	0.210
2.9V±2.0%	0.145	4.3V±2.0%	0.215
3.0V±2.0%	0.150	4.4V±2.0%	0.220
3.1V±2.0%	0.155	4.5V±2.0%	0.225

■ OUTPUT CONFIGURATIONS

Implementation	CMOS
With different power supplies	No
With active low reset CPUs	Yes
With active high reset CPUs	No
With voltage divider variable resistors	No

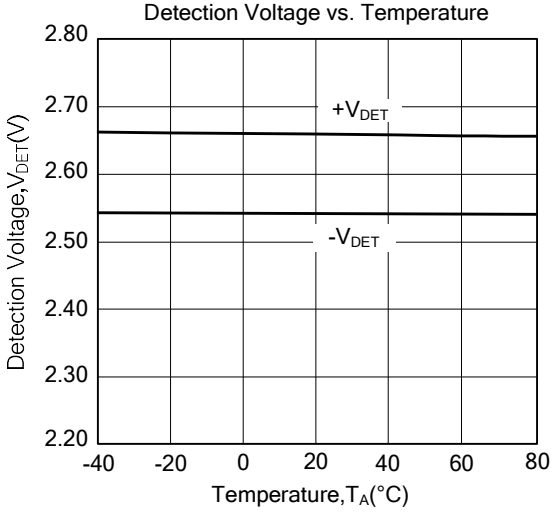
Example with one power supply



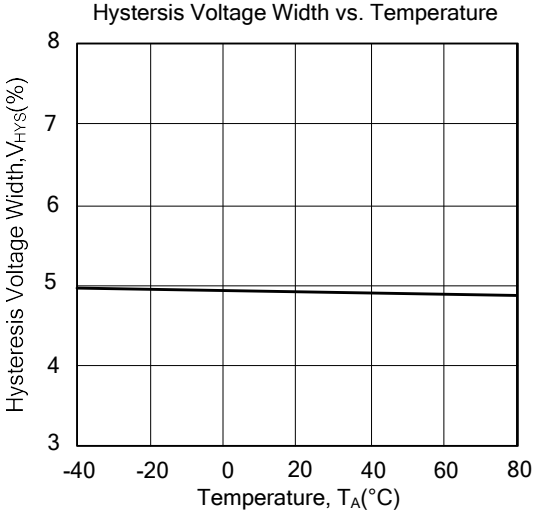
■ TYPICAL CHARACTERISTICS

88C25

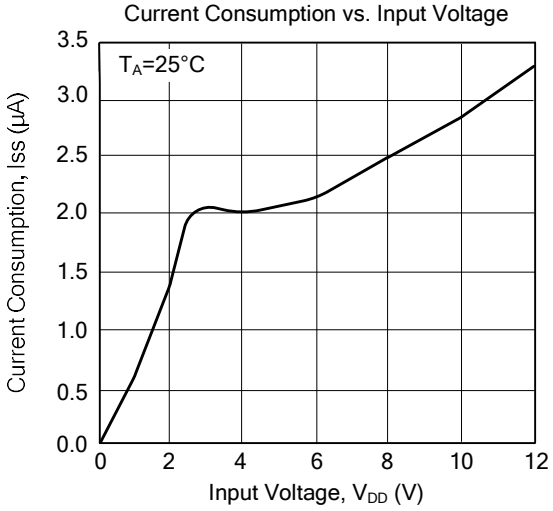
Detection Voltage vs. Temperature



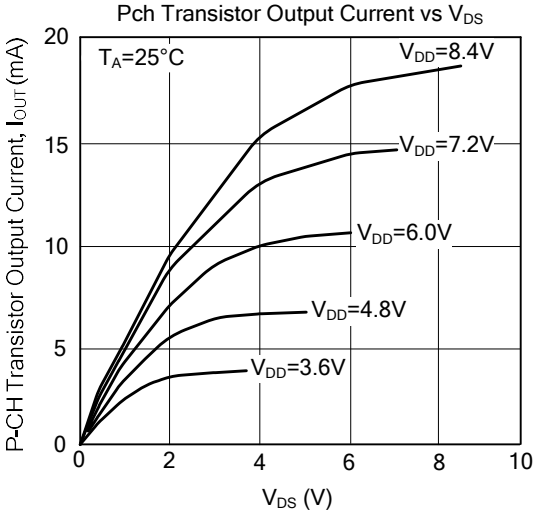
Hystersis Voltage Width vs. Temperature



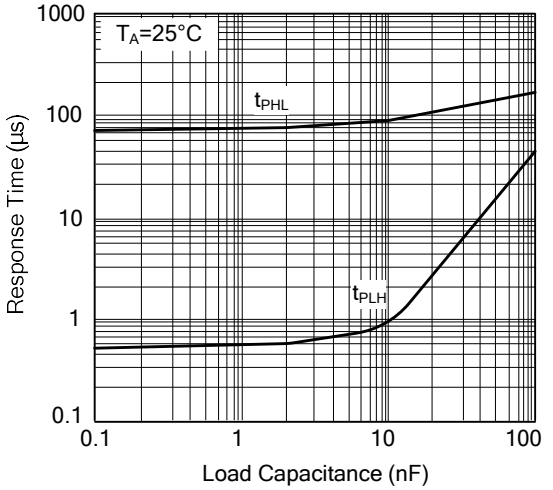
Current Consumption vs. Input Voltage



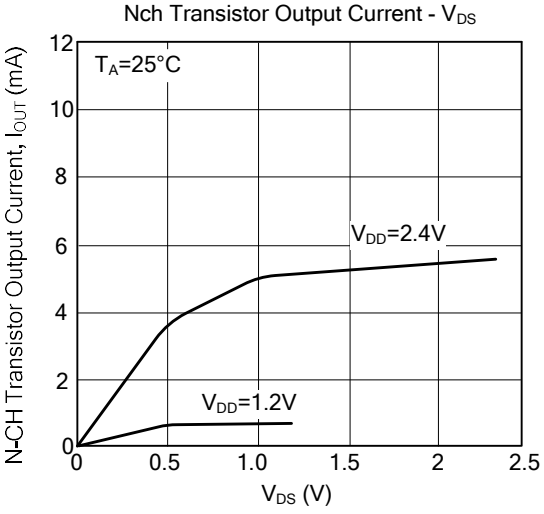
Pch Transistor Output Current vs V_{DS}



Dynamic Response vs. C_{OUT} (CD pin; open)

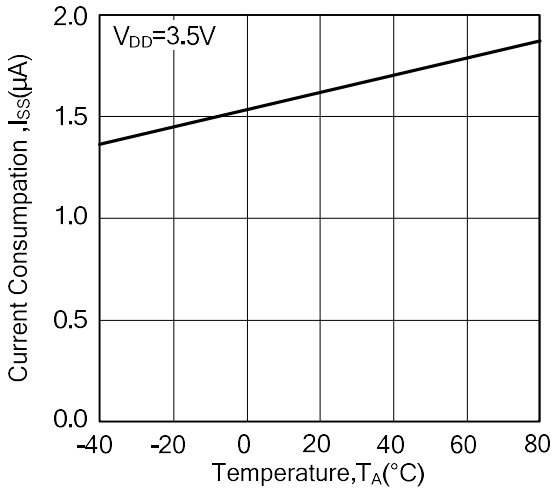


Nch Transistor Output Current - V_{DS}

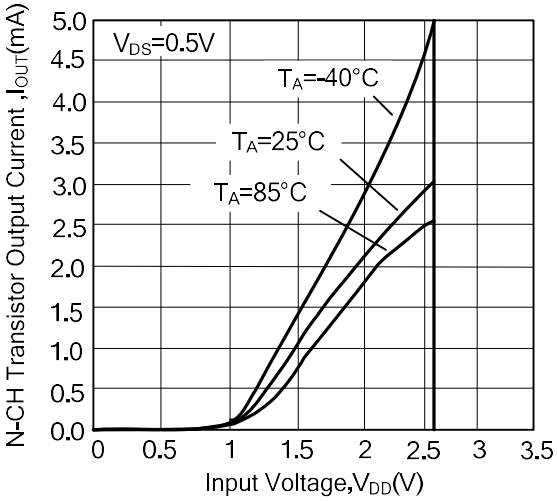


■ TYPICAL CHARACTERISTICS (Cont.)

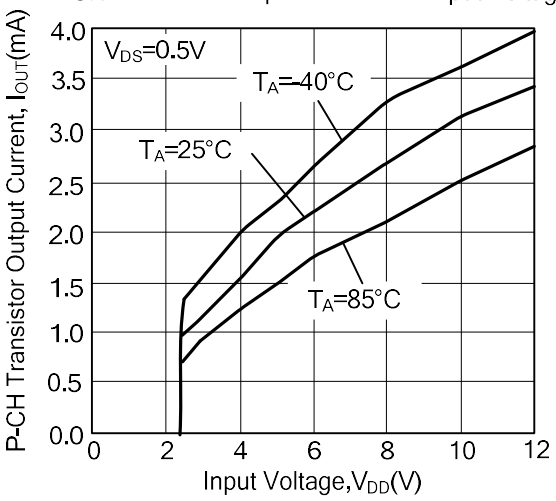
Current Consumpation vs. Tempreature



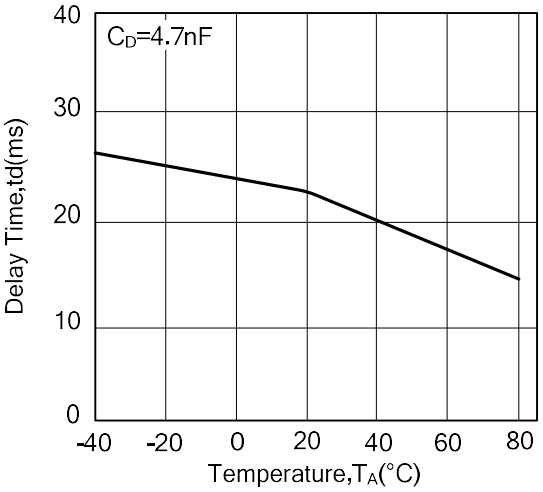
N-CH Transisor Output Current vs. Input Voltage



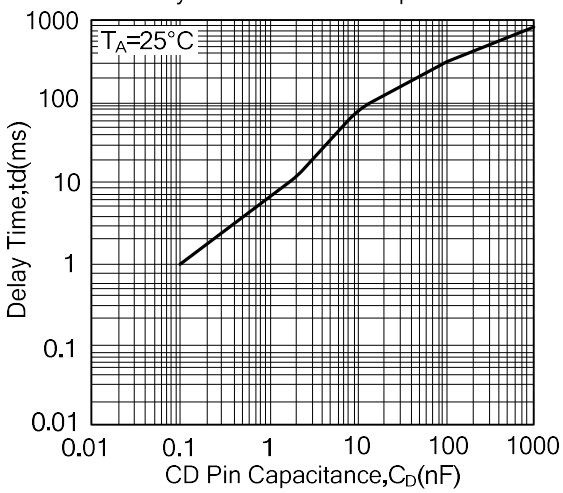
P-CH Transistor Output Current vs. Input Voltage



Delay Time vs Temperature



Delay Time vs CD Pin Capacitance



■ TYPICAL CHARACTERISTICS (Cont.)

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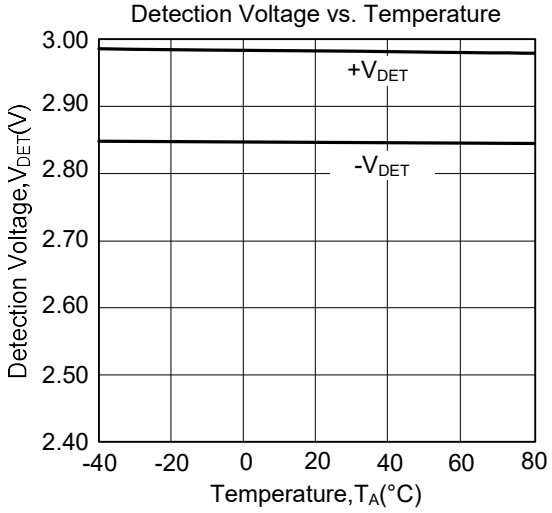
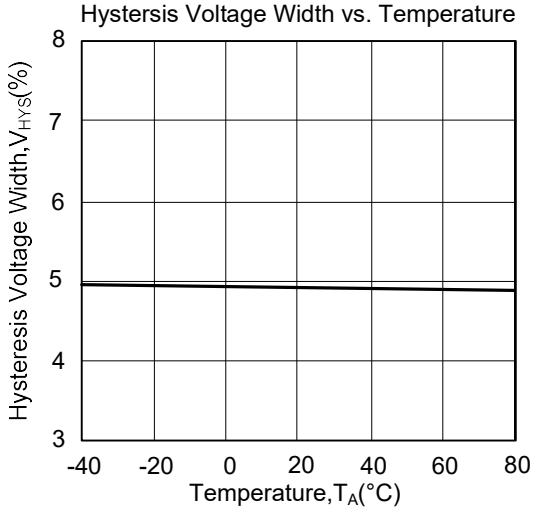
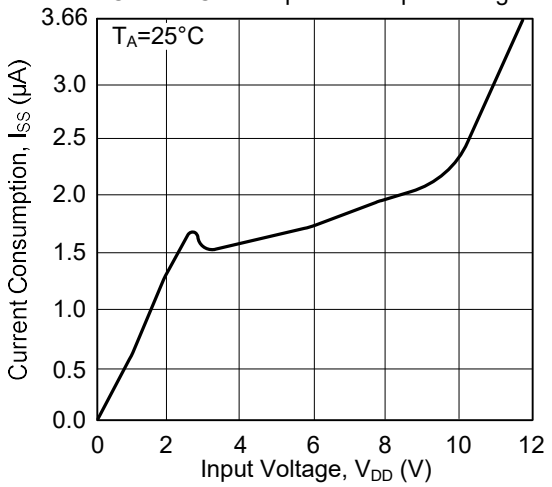
Detection Voltage vs. Temperature



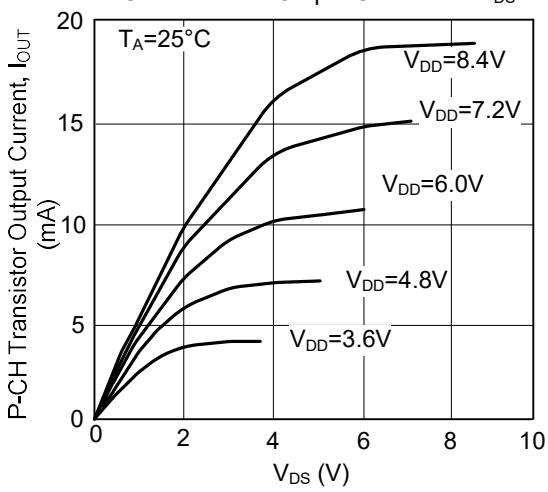
Hystersis Voltage Width vs. Temperature



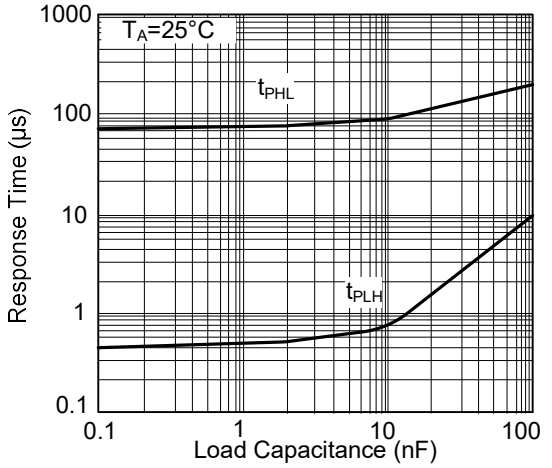
Current Consumption vs. Input Voltage



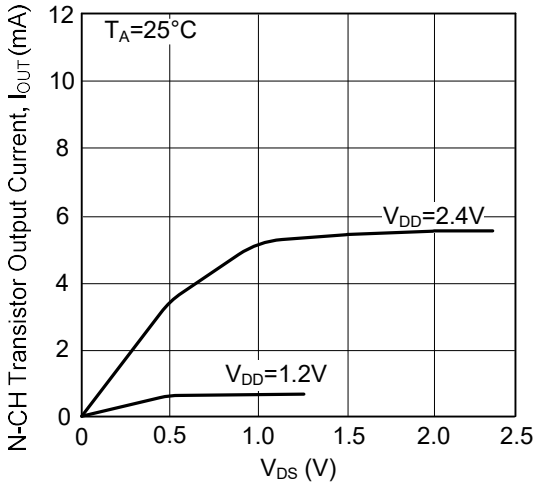
P-CH Transistor Output Current vs. V_{DS}



Dynamic Response vs. C_{OUT} (CD pin; open)

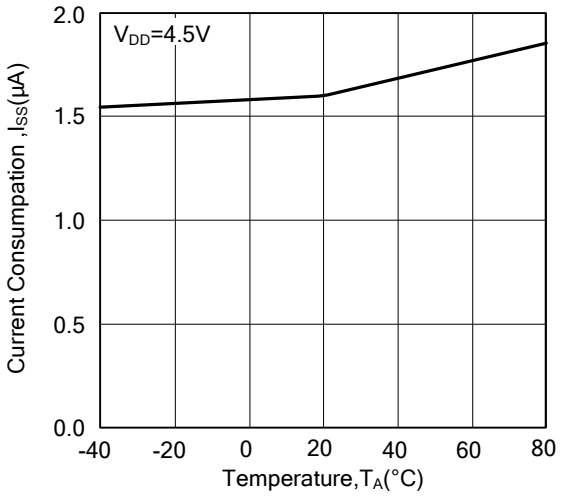


N-CH Transistor Output Current - V_{DS}

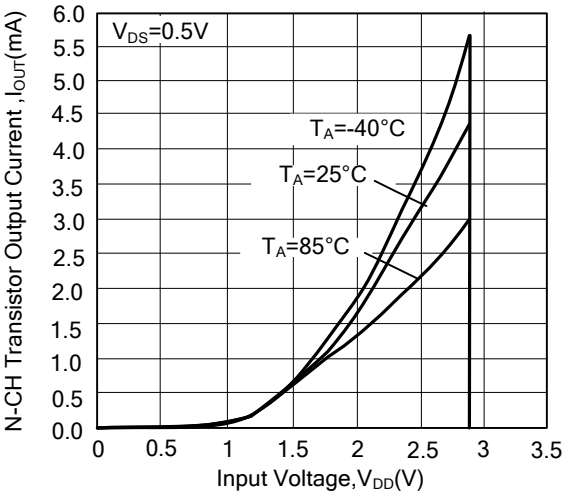


■ TYPICAL CHARACTERISTICS (Cont.)

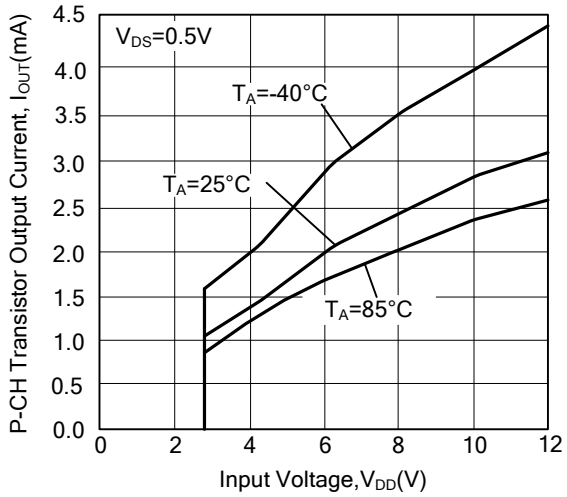
Current Consumpation vs. Tempreature



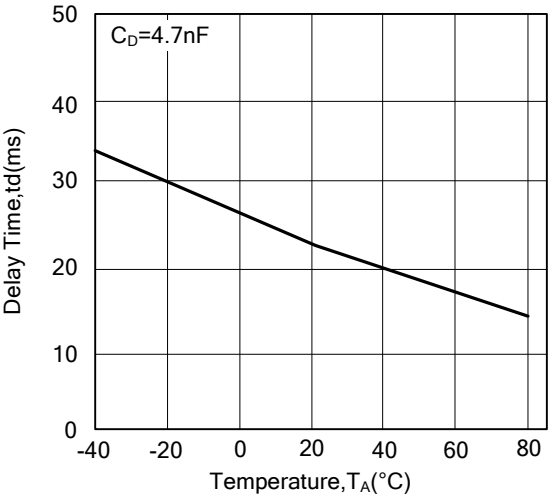
N-CH Transisor Output Current vs. Input Voltage



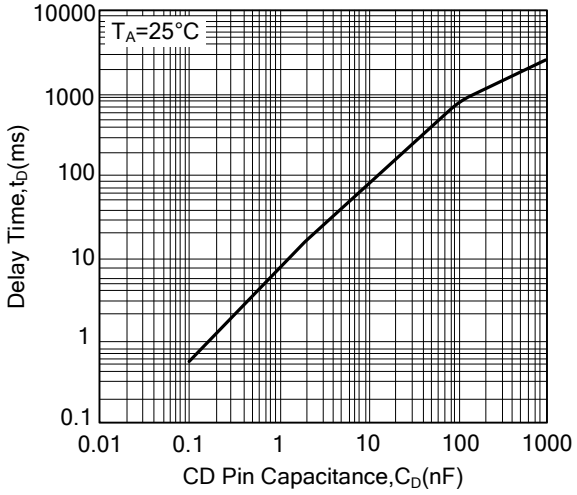
P-CH Transistor Output Current vs. Input Voltage



Delay Time vs. Temperature



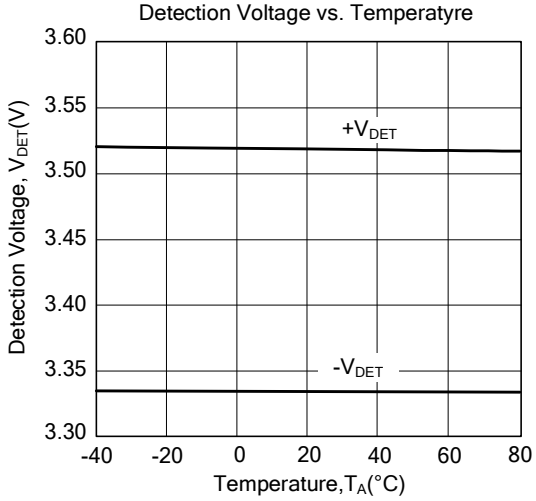
Delay Time vs. CD Pin Capacitance



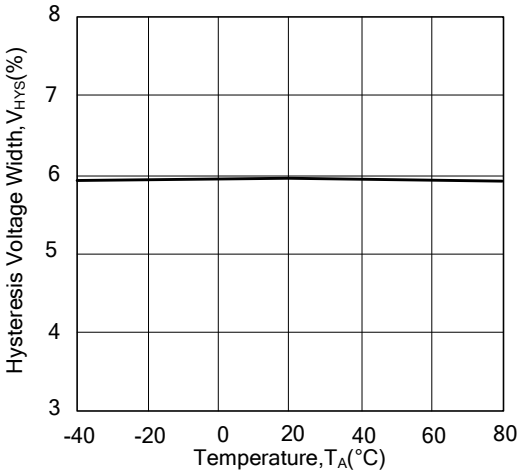
■ TYPICAL CHARACTERISTICS (Cont.)

88C33

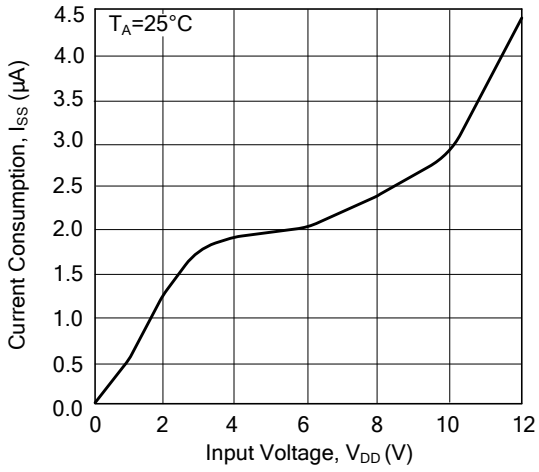
Detection Voltage vs. Temperatyre



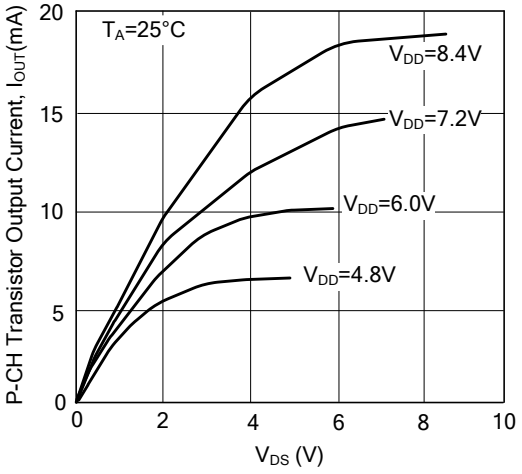
Hystersis Voltage Width vs. Temperature



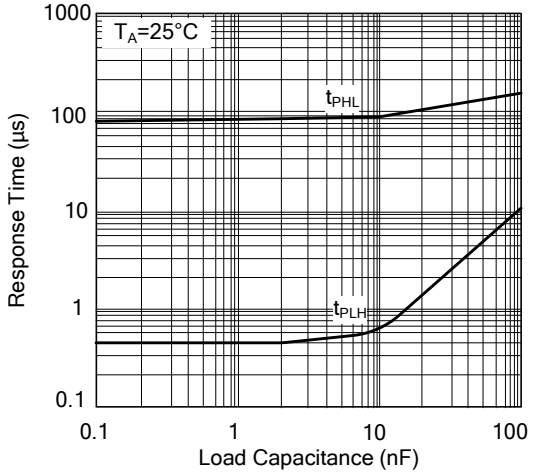
Current Consumption vs. Input Voltage



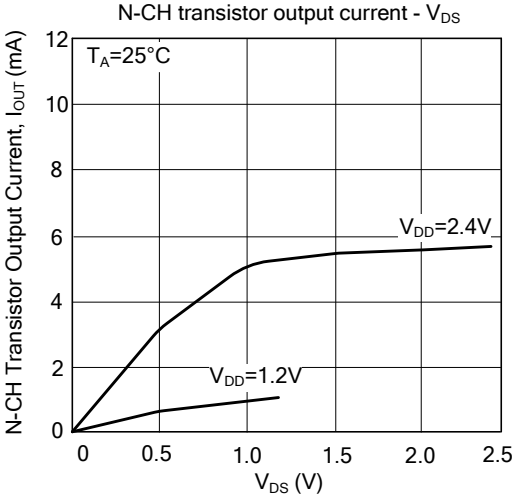
P-CH Transistor Output Current vs V_{DS}



Dynamic Response vs. C_{OUT} (CD pin; open)

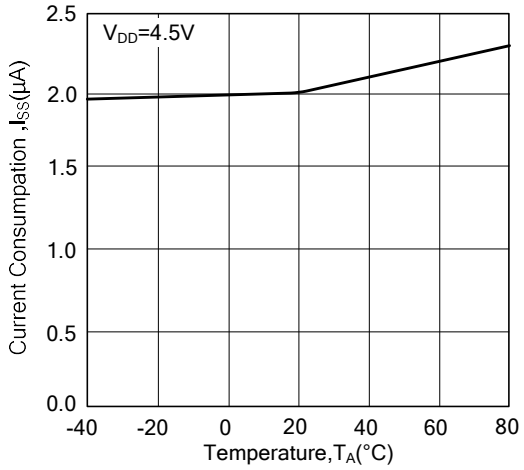


N-CH transistor output current - V_{DS}

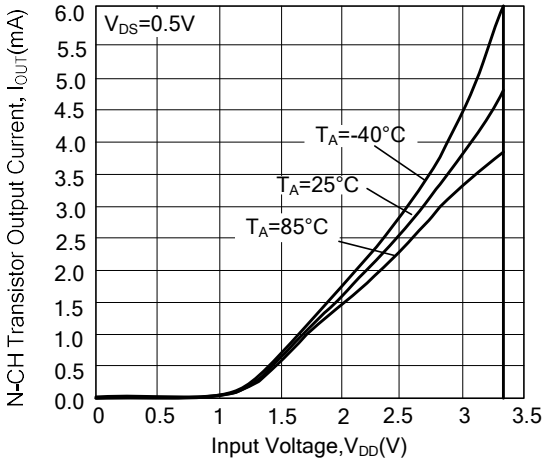


■ TYPICAL CHARACTERISTICS (Cont.)

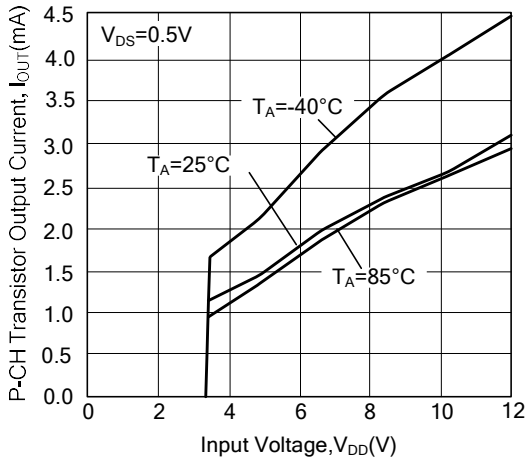
Current Consumpation vs. Tempreature



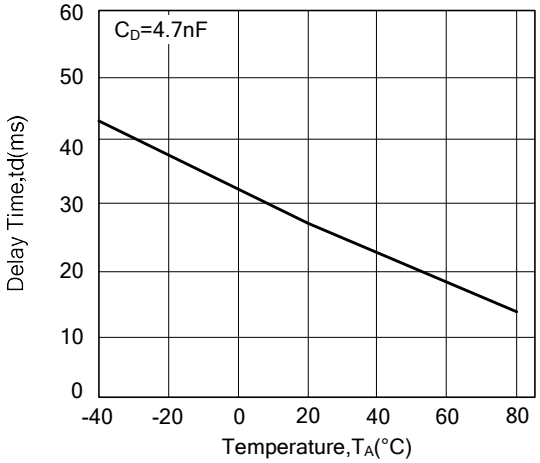
N-CH Transisor Output Current vs. Input Voltage



P-CH Transistor Output Current vs. Input Voltage



Delay Time vs. Temperature



Delay Time vs. CD Pin Capacitance