

HAT2028R/HAT2028RJ

Silicon N Channel Power MOS FET
High Speed Power Switching

HITACHI

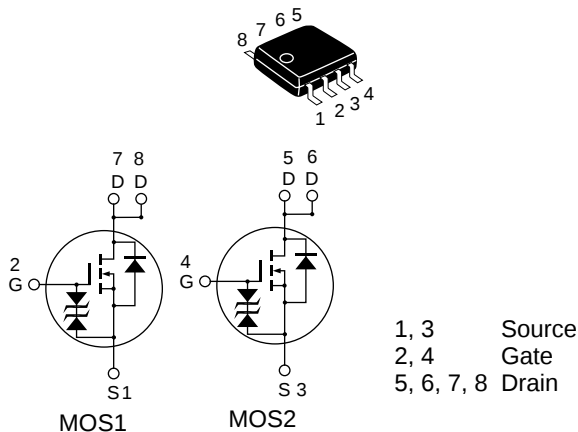
ADE-208-524C (Z)
4th. Edition
February 1999

Features

- For Automotive Application (at Type Code “J “)
- Low on-resistance
- Capable of 4 V gate drive
- High density mounting

Outline

SOP-8



Absolute Maximum Ratings (Ta = 25°C)

Item		Symbol	Ratings	Unit
Drain to source voltage		V_{DSS}	60	V
Gate to source voltage		V_{GSS}	± 20	V
Drain current		I_D	4	A
Drain peak current		$I_{D(pulse)}$ ^{Note1}	32	A
Body-drain diode reverse drain current		I_{DR}	4	A
Avalanche current	HAT2028R	I_{AP} ^{Note4}	—	—
	HAT2028RJ		4	A
Avalanche energy	HAT2028R	E_{AR} ^{Note4}	—	—
	HAT2028RJ		1.37	mJ
Channel dissipation		P_{ch} ^{Note2}	2	W
Channel dissipation		P_{ch} ^{Note3}	3	W
Channel temperature		T_{ch}	150	°C
Storage temperature		T_{stg}	− 55 to + 150	°C

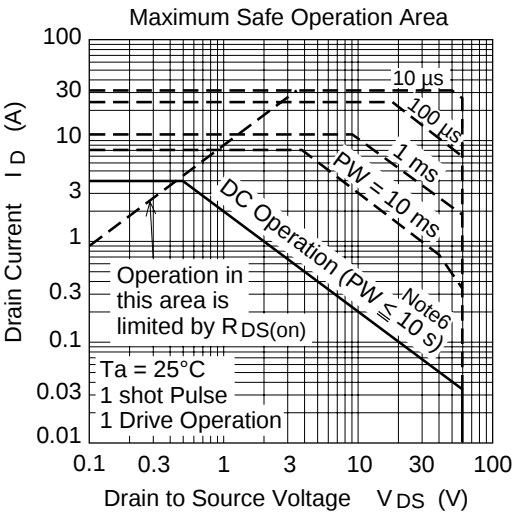
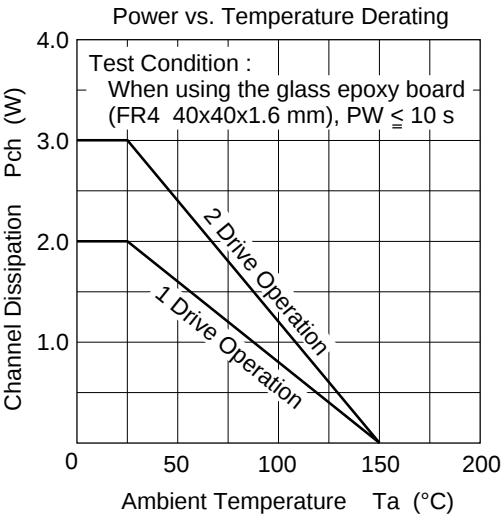
- Note:
- 1. $PW \leq 10\mu s$, duty cycle $\leq 1\%$
 - 2. 1 Drive operation : When using the glass epoxy board (FR4 40 x 40 x 1.6 mm), $PW \leq 10s$
 - 3. 2 Drive operation : When using the glass epoxy board (FR4 40 x 40 x 1.6 mm), $PW \leq 10s$
 - 4. Value at $T_{ch}=25^{\circ}C$, $R_g \geq 50\Omega$

Electrical Characteristics (Ta = 25°C)

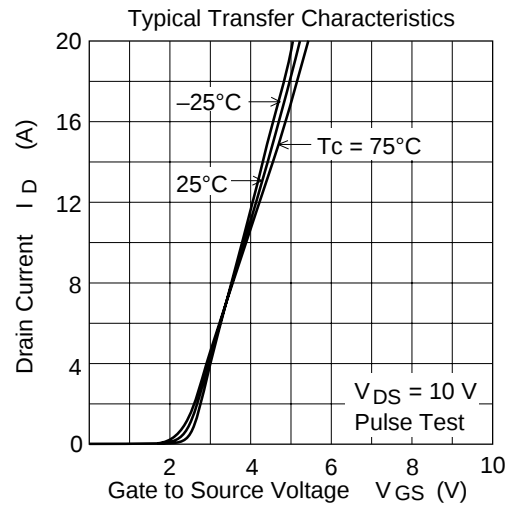
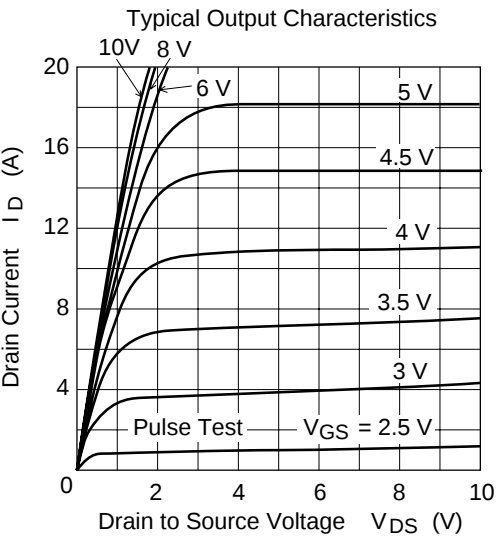
Item		Symbol	Min	Typ	Max	Unit	Test Conditions
Drain to source breakdownvoltage		$V_{(BR)DSS}$	60	—	—	V	$I_D = 10\text{ mA}$, $V_{GS} = 0$
Gate to source breakdownvoltage		$V_{(BR)GSS}$	± 20	—	—	V	$I_G = \pm 100\text{ }\mu\text{A}$, $V_{DS} = 0$
Gate to source leak current		I_{GSS}	—	—	± 10	μA	$V_{GS} = \pm 16\text{ V}$, $V_{DS} = 0$
Zero gate voltage	HAT2028R	I_{DSS}	—	—	1	μA	$V_{DS} = 60\text{ V}$, $V_{GS} = 0$
drain current	HAT2028RJ	I_{DSS}	—	—	0.1	μA	
Zero gate voltage	HAT2028R	I_{DSS}	—	—	—	μA	$V_{DS} = 48\text{ V}$, $V_{GS} = 0$ $T_a = 125^\circ\text{C}$
drain current	HAT2028RJ	I_{DSS}	—	—	10	μA	
Gate to source cutoff voltage		$V_{GS(off)}$	1.3	—	2.3	V	$V_{DS} = 10\text{ V}$, $I_D = 1\text{ mA}$
Static drain to source on state resistance		$R_{DS(on)}$	—	0.08	0.1	Ω	$I_D = 2\text{ A}$, $V_{GS} = 10\text{ V}$ ^{Note5}
		$R_{DS(on)}$	—	0.12	0.16	Ω	$I_D = 2\text{ A}$, $V_{GS} = 4\text{ V}$ ^{Note5}
Forward transfer admittance		$ y_{fs} $	3.3	5	—	S	$I_D = 2\text{ A}$, $V_{DS} = 10\text{ V}$ ^{Note5}
Input capacitance		C_{iss}	—	280	—	pF	$V_{DS} = 10\text{ V}$
Output capacitance		C_{oss}	—	150	—	pF	$V_{GS} = 0$
Reverse transfer capacitance		C_{rss}	—	55	—	pF	$f = 1\text{ MHz}$
Turn-on delay time		$t_{d(on)}$	—	15	—	ns	$V_{GS} = 4\text{ V}$, $I_D = 2\text{ A}$
Rise time		t_r	—	100	—	ns	$V_{DD} \cong 30\text{ V}$
Turn-off delay time		$t_{d(off)}$	—	35	—	ns	
Fall time		t_f	—	45	—	ns	
Body–drain diode forwardvoltage		V_{DF}	—	0.88	1.15	V	$I_F = 4\text{ A}$, $V_{GS} = 0$ ^{Note5}
Body–drain diode reverse recovery time		t_{rr}	—	40	—	ns	$I_F = 4\text{ A}$, $V_{GS} = 0$ $diF/dt = 50\text{ A}/\mu\text{s}$

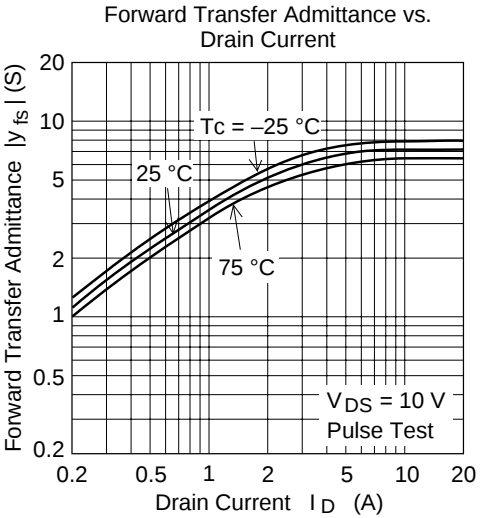
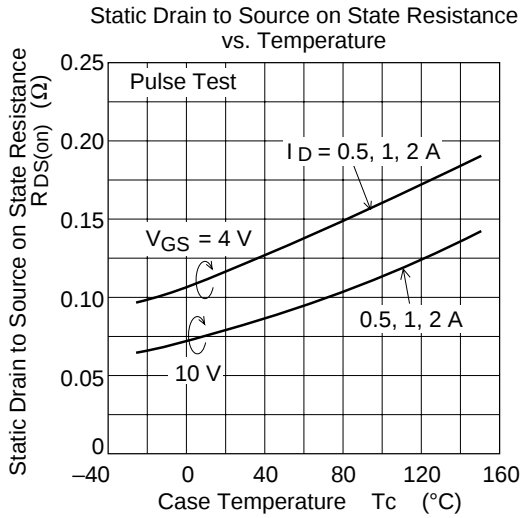
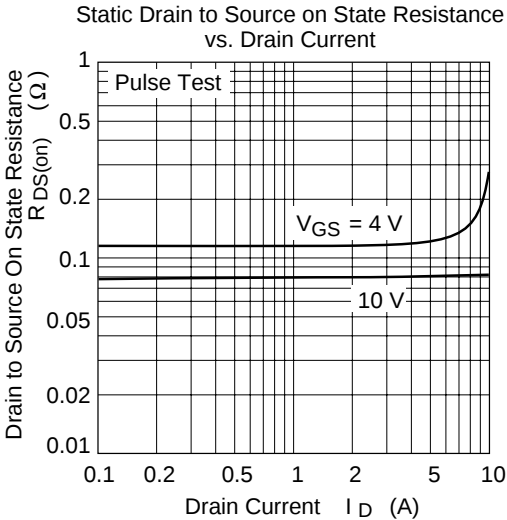
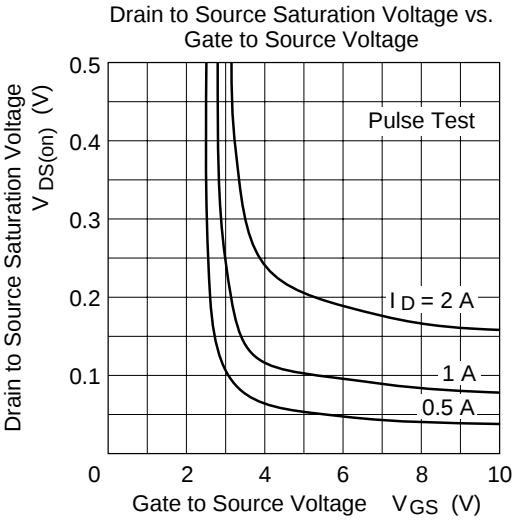
Note: 5. Pulse test

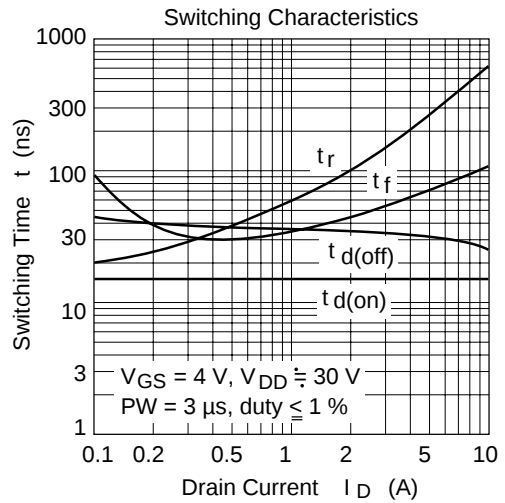
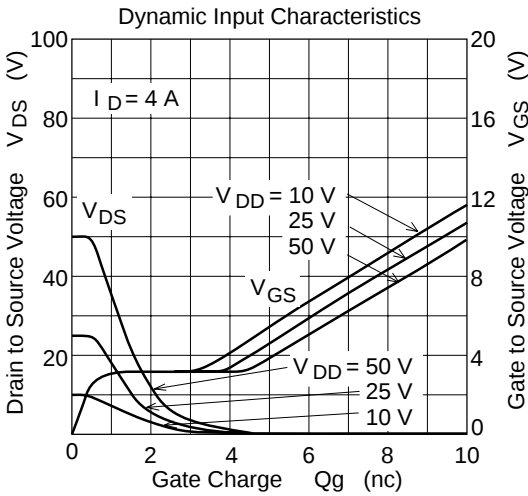
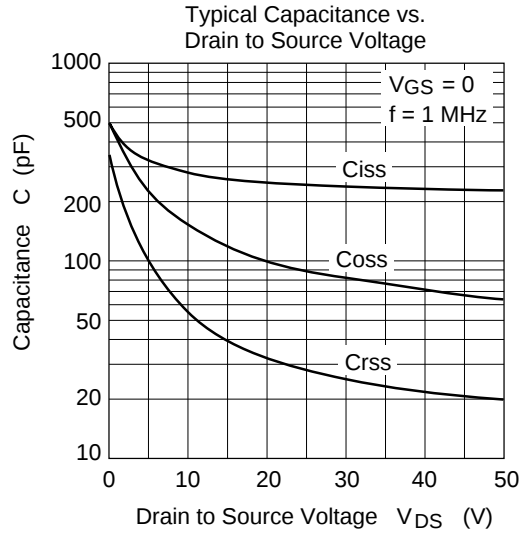
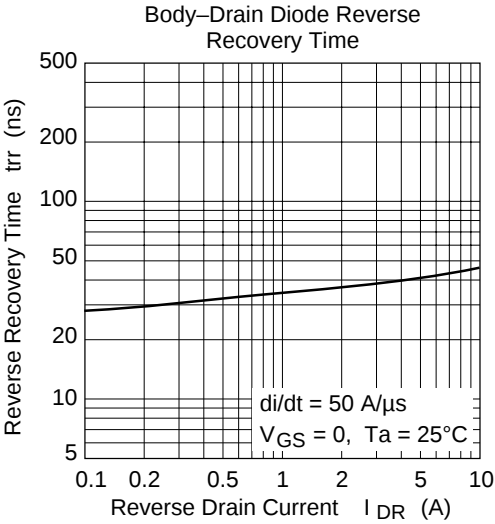
Main Characteristics

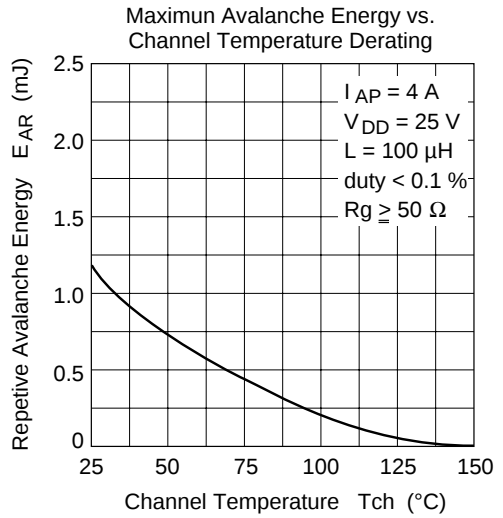
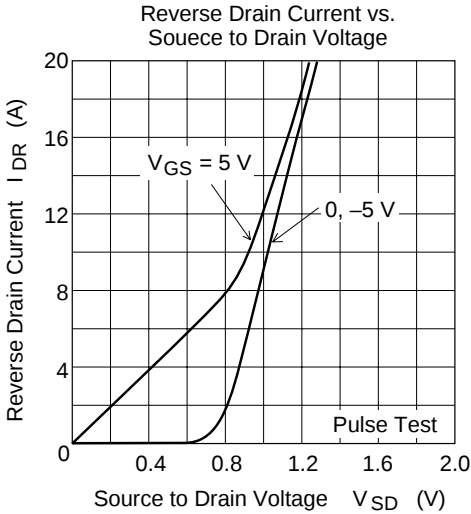


Note 6 :
When using the glass epoxy board
(FR4 40x40x1.6 mm)

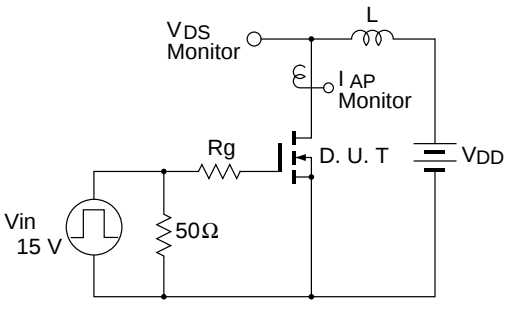






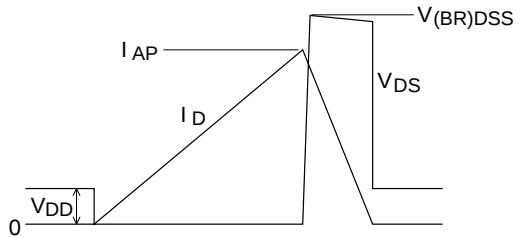


Avalanche Test Circuit

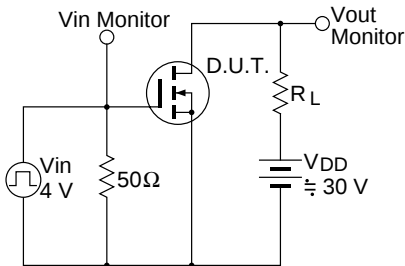


Avalanche Waveform

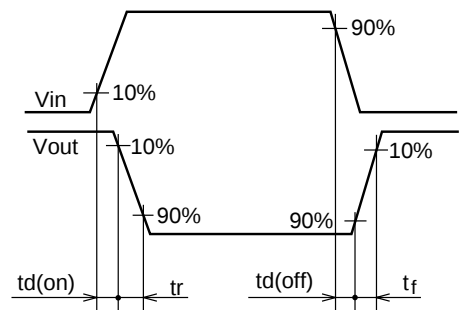
$$E_{AR} = \frac{1}{2} \cdot L \cdot I_{AP}^2 \cdot \frac{V_{DSS}}{V_{DSS} - V_{DD}}$$

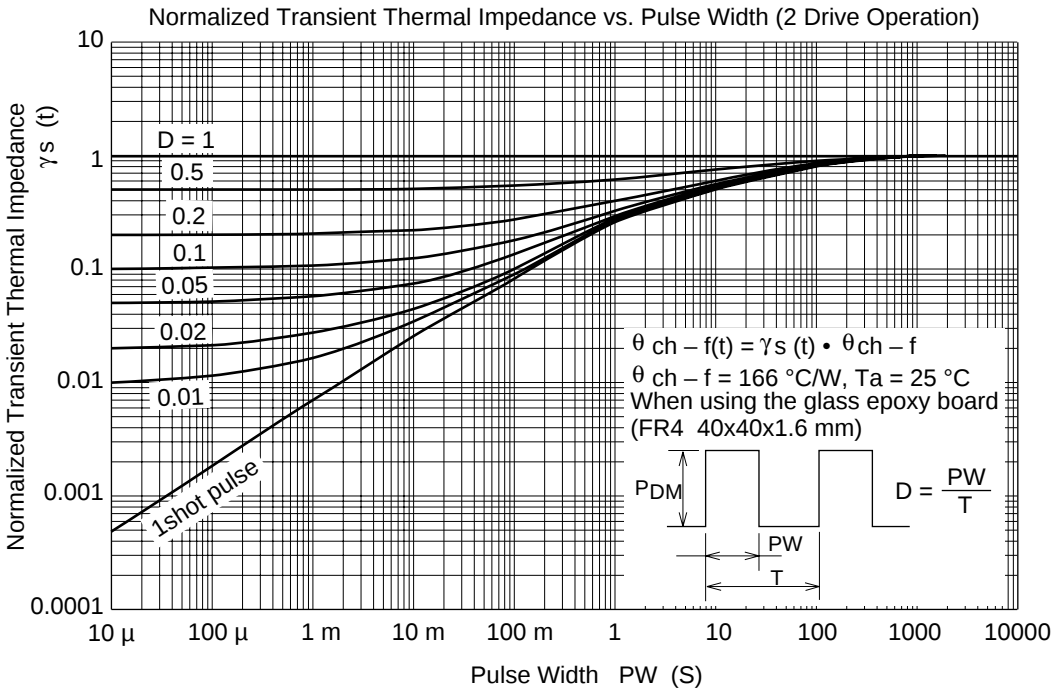
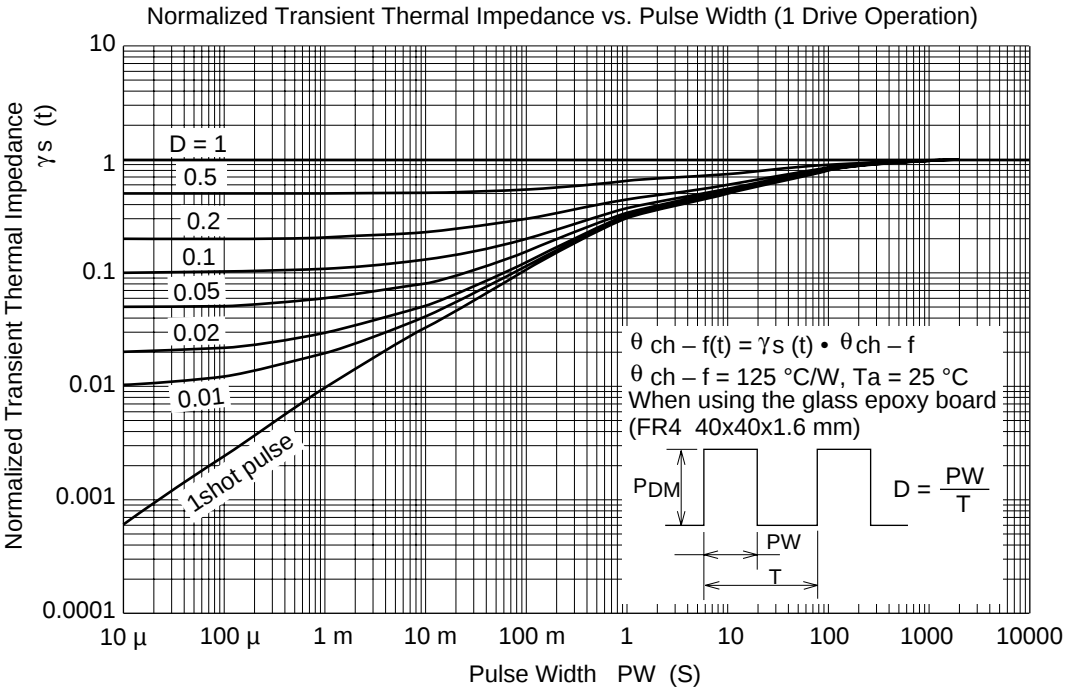


Switching Time Test Circuit



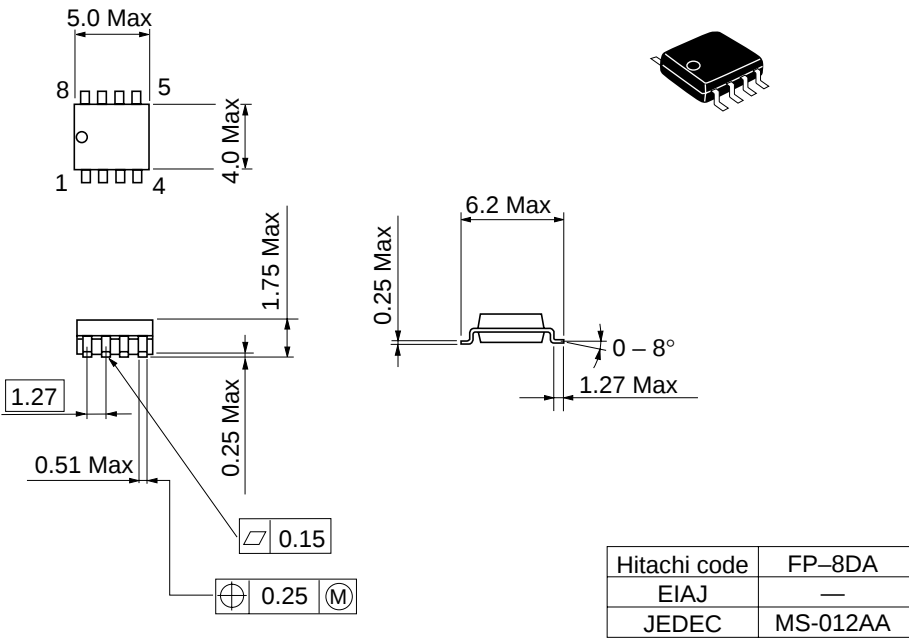
Switching Time Waveform





Package Dimensions

Unit: mm



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