

HAT2033R/HAT2033RJ

Silicon N Channel Power MOS FET
High Speed Power Switching

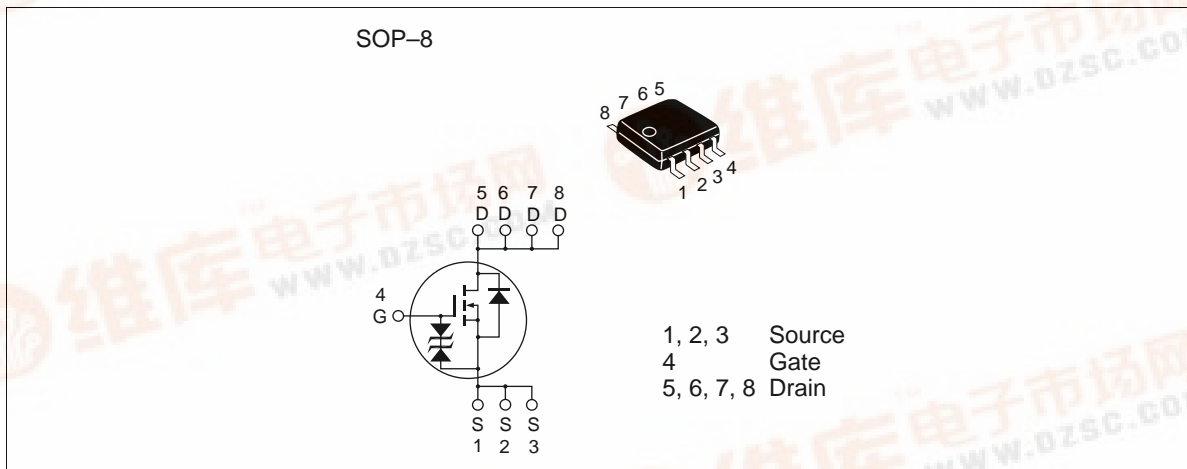
HITACHI

ADE-208-664B (Z)
3rd. Edition
February 1999

Features

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

Outline



HAT2033R/HAT2033RJ

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	7	A
Drain peak current		$I_{D(pulse)}$ ^{Note1}	56	A
Body-drain diode reverse drain current		I_{DR}	7	A
Avalanche current	HAT2033R	I_{AP} ^{Note4}	—	—
	HAT2033RJ		7	A
Avalanche energy	HAT2033R	E_{AR} ^{Note4}	—	—
	HAT2033RJ		4.2	mJ
Channel dissipation		P_{ch} ^{Note2}	2.5	W
Channel temperature		Tch	150	°C
Storage temperature		Tstg	- 55 to + 150	°C

- Note: 1. $PW \leq 10\mu s$, duty cycle $\leq 1\%$
2. When using the glass epoxy board (FR4 40 x 40 x 1.6 mm), $PW \leq 10s$
3. Value at Tch=25°C, Rg $\geq 50\Omega$

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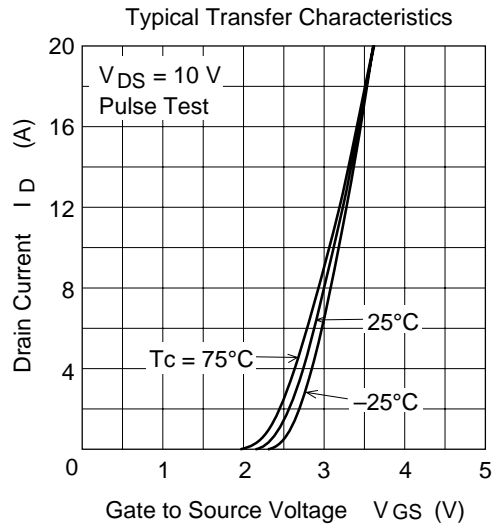
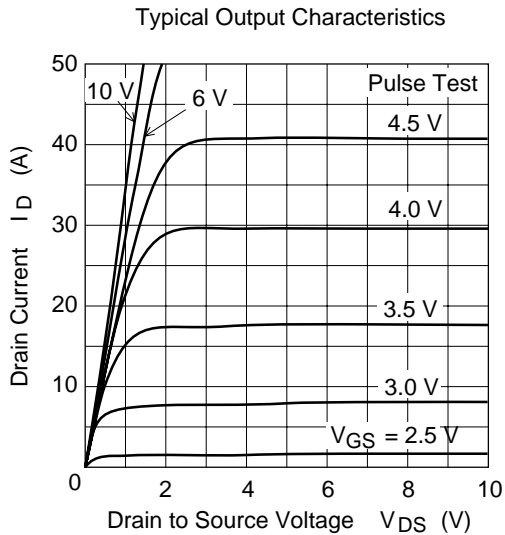
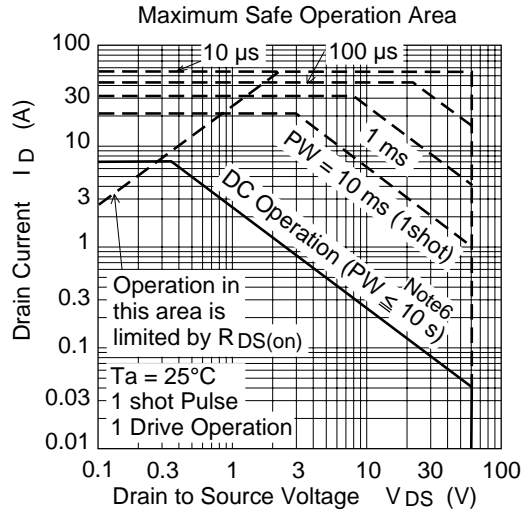
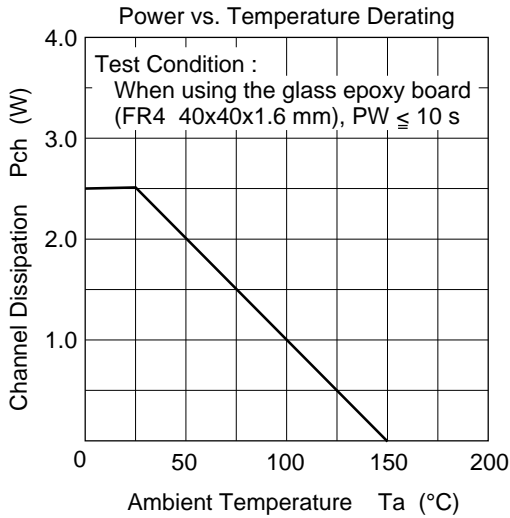
Electrical Characteristics (Ta = 25°C)

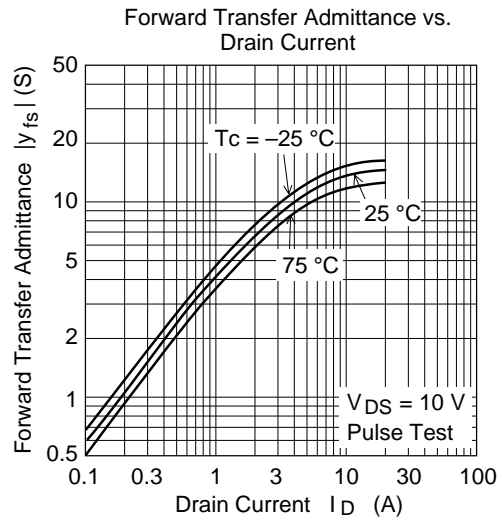
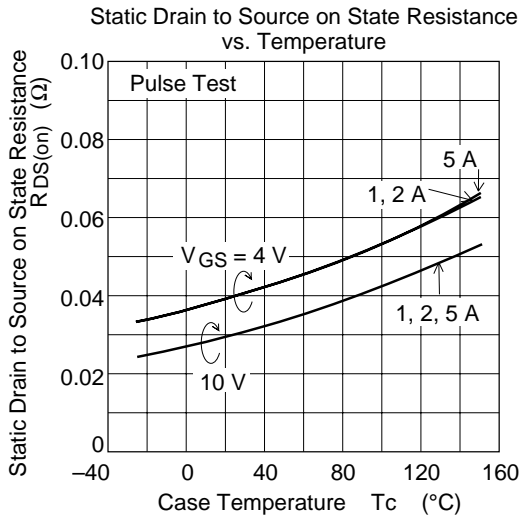
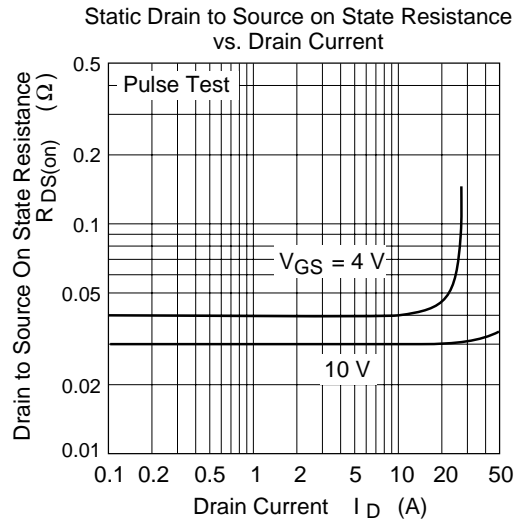
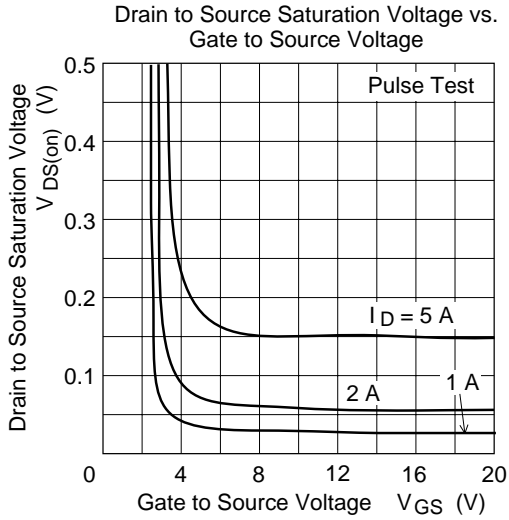
Item		Symbol	Min	Typ	Max	Unit	Test Conditions
Drain to source breakdown voltage		$V_{(BR)DSS}$	60	—	—	V	$I_D = 10 \text{ mA}$, $V_{GS} = 0$
Gate to source breakdown voltage		$V_{(BR)GSS}$	± 20	—	—	V	$I_G = \pm 100 \text{ }\mu\text{A}$, $V_{DS} = 0$
Gate to source leak current		I_{GSS}	—	—	± 10	μA	$V_{GS} = \pm 16 \text{ V}$, $V_{DS} = 0$
Zero gate voltage drain current	HAT2033R	I_{DSS}	—	—	1	μA	$V_{DS} = 60 \text{ V}$, $V_{GS} = 0$
Zero gate voltage drain current	HAT2033RJ	I_{DSS}	—	—	0.1	μA	
Zero gate voltage drain current	HAT2033R	I_{DSS}	—	—	—	μA	$V_{DS} = 4 \text{ 8V}$, $V_{GS} = 0$
Zero gate voltage drain current	HAT2033RJ	I_{DSS}	—	—	10	μA	Ta = 125°C
Gate to source cutoff voltage		$V_{GS(off)}$	1.2	—	2.2	V	$V_{DS} = 10 \text{ V}$, $I_D = 1 \text{ mA}$
Static drain to source on state resistance		$R_{DS(on)}$	—	0.03	0.038	Ω	$I_D = 4 \text{ A}$, $V_{GS} = 10 \text{ V}$ ^{Note4}
		$R_{DS(on)}$	—	0.04	0.053	Ω	$I_D = 4 \text{ A}$, $V_{GS} = 4 \text{ V}$ ^{Note4}
Forward transfer admittance		$ y_{fs} $	6.5	10	—	S	$I_D = 4 \text{ A}$, $V_{DS} = 10 \text{ V}$ ^{Note4}
Input capacitance		Ciss	—	740	—	pF	$V_{DS} = 10 \text{ V}$
Output capacitance		Coss	—	370	—	pF	$V_{GS} = 0$
Reverse transfer capacitance		Crss	—	130	—	pF	f = 1MHz
Turn-on delay time		$t_{d(on)}$	—	13	—	ns	$V_{GS} = 10 \text{ V}$, $I_D = 4 \text{ A}$
Rise time		t_r	—	55	—	ns	$V_{DD} \cong 30 \text{ V}$
Turn-off delay time		$t_{d(off)}$	—	140	—	ns	
Fall time		t_f	—	95	—	ns	
Body–drain diode forward voltage		V_{DF}	—	0.82	1.07	V	$I_F = 7 \text{ A}$, $V_{GS} = 0$ ^{Note4}
Body–drain diode reverse recovery time		t_{rr}	—	45	—	ns	$I_F = 7 \text{ A}$, $V_{GS} = 0$ $diF/dt = 50 \text{ A}/\mu\text{s}$

Note: 4. Pulse test

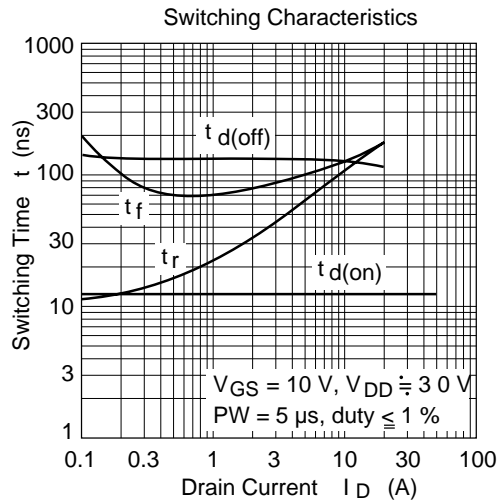
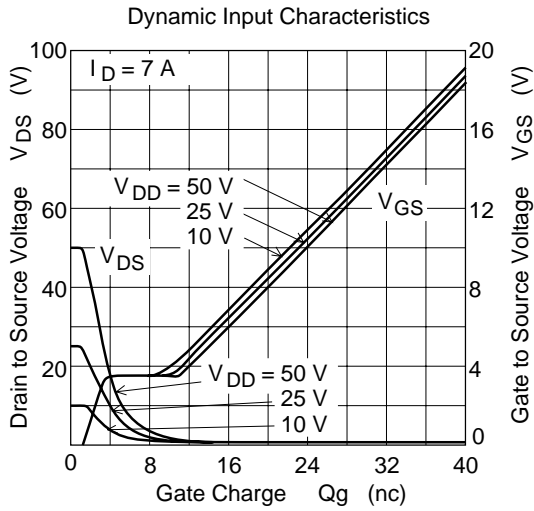
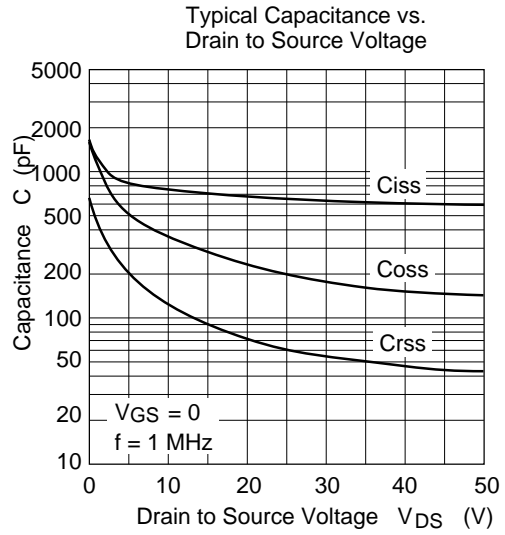
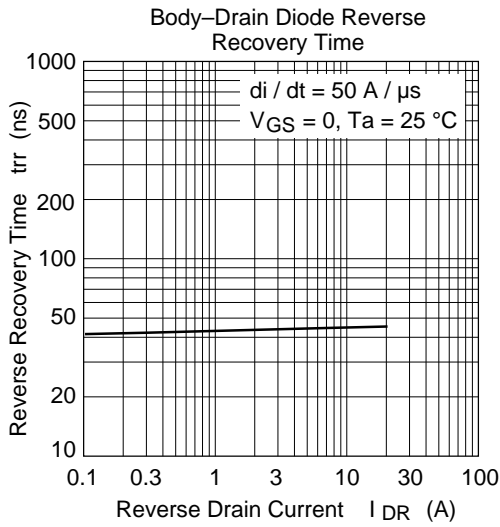
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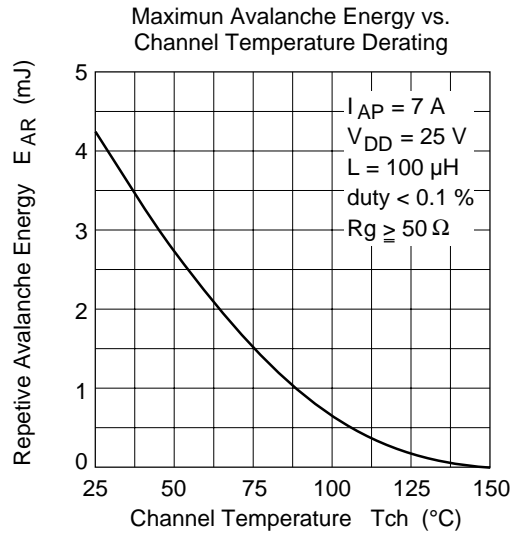
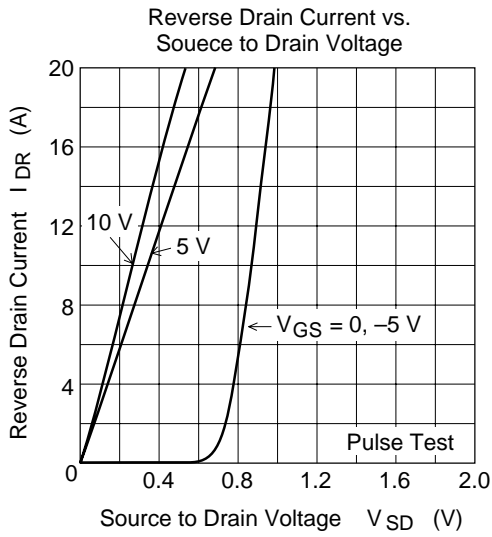
Main Characteristics



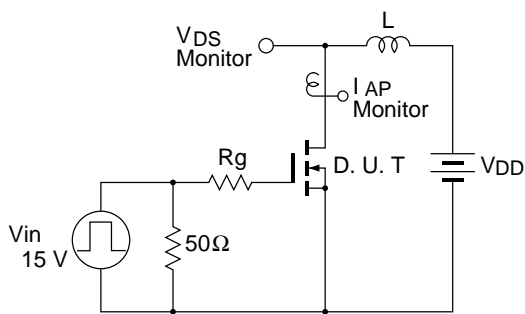


HAT2033R/HAT2033RJ



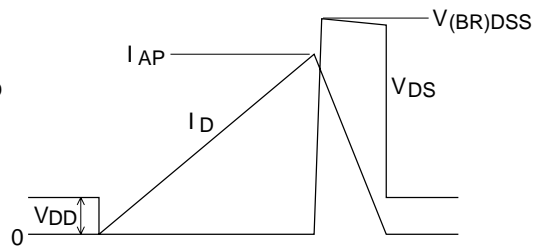


Avalanche Test Circuit

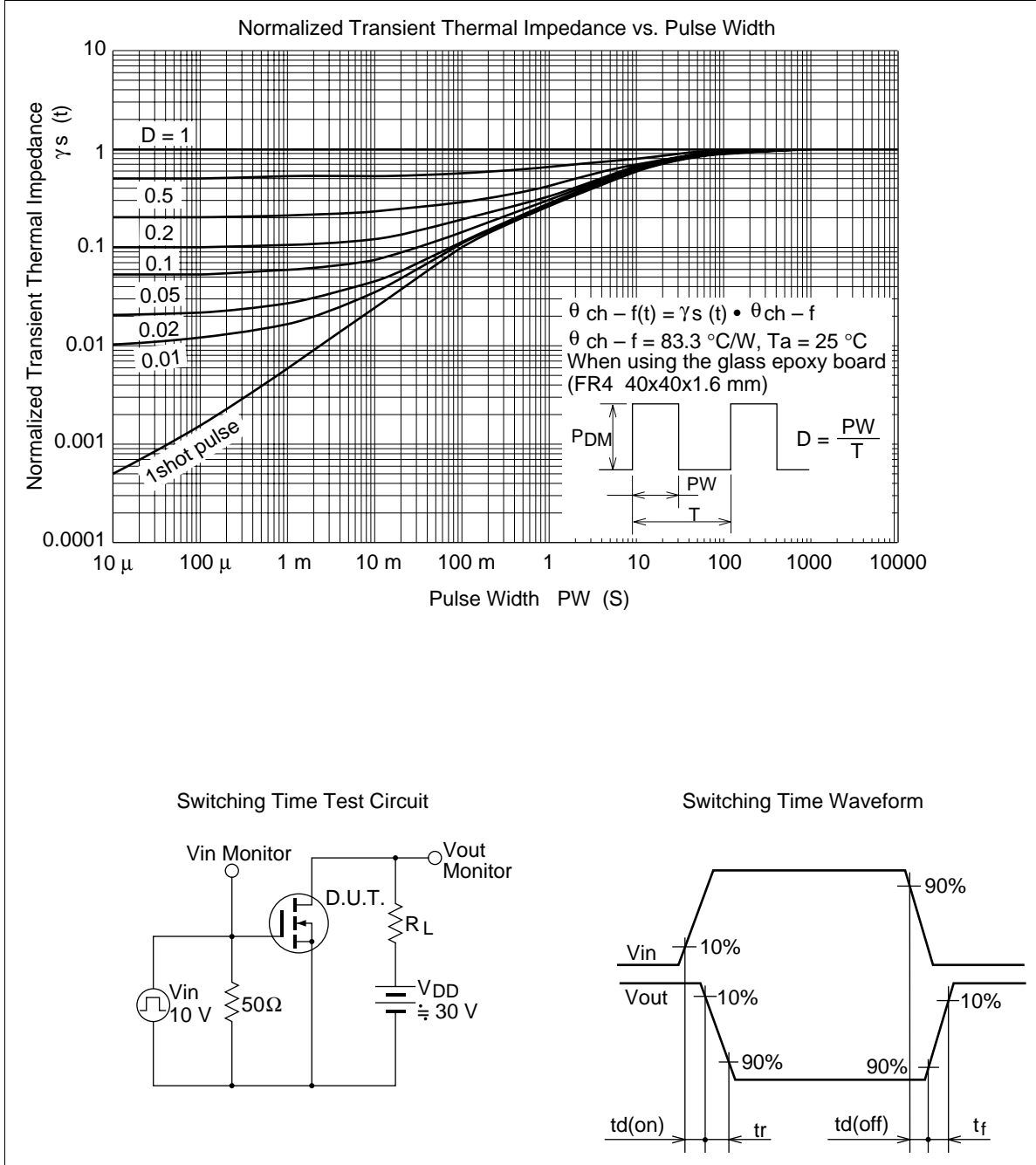


Avalanche Waveform

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



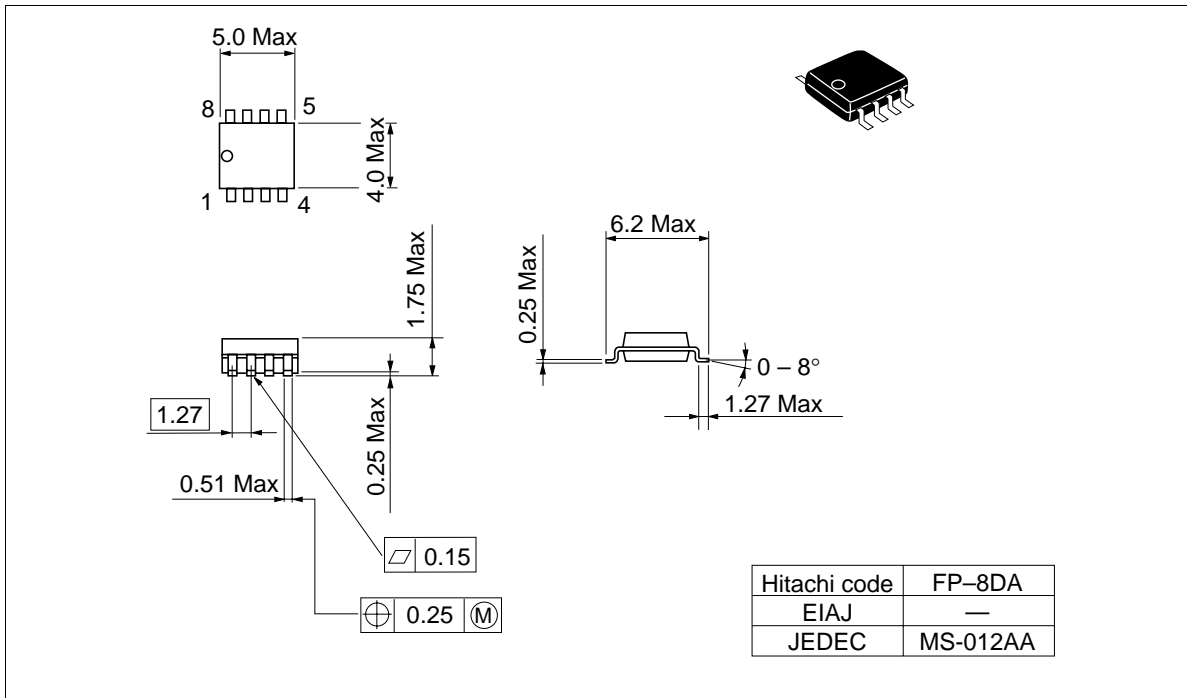
HAT2033R/HAT2033RJ



HAT2033R/HAT2033RJ

Package Dimensions

Unit: mm



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