HAT2058R/HAT2058RJ

Silicon N Channel Power MOS FET
High Speed Power Switching

HITACHI

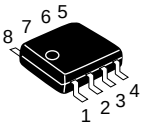
ADE-208-934 (Z)
1st. Edition
Mar. 2001

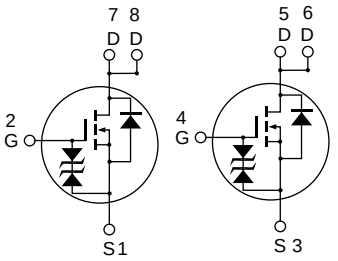
Features

- Low on-resistance
- Capable of 4 V gate drive
- Low drive current
- High density mounting
- "J" is for Automotive application
  High temperature D-S leakage guarantee
  Avalanche rating

Outline

SOP-8





1, 3	Source
2, 4	Gate
5, 6, 7, 8	Drain

Hitachi semiconductor

Absolute Maximum Ratings (Ta = 25°C)

Item	Symbol	Ratings		Unit
		HAT2058R	HAT2058RJ	
Drain to source voltage	V_{DSS}	100	100	V
Gate to source voltage	V_{GSS}	±20	±20	V
Drain current	I_D	4	4	A
Drain peak current	I_D (pulse) Note1	32	32	A
Body-drain diode reverse drain current	I_{DR}	4	4	A
Avalanche current	I_{AP} Note4	—	4	A
Avalanche energy	E_{AR} Note4	—	1.6	mJ
Channel dissipation	Pch Note2	2	2	W
	Pch Note3	3	3	W
Channel temperature	Tch	150	150	°C
Storage temperature	Tstg	–55 to +150	–55 to +150	°C

Notes: 1. PW ≤ 10 μs, duty cycle ≤ 1%
2. 1 Drive operation; When using the glass epoxy board (FR4 40 x 40 x 1.6 mm), PW ≤ 10 s
3. 2 Drive operation; When using the glass epoxy board (FR4 40 x 40 x 1.6 mm), PW ≤ 10 s
4. Value at Tch = 25°C, Rg ≥ 50 Ω

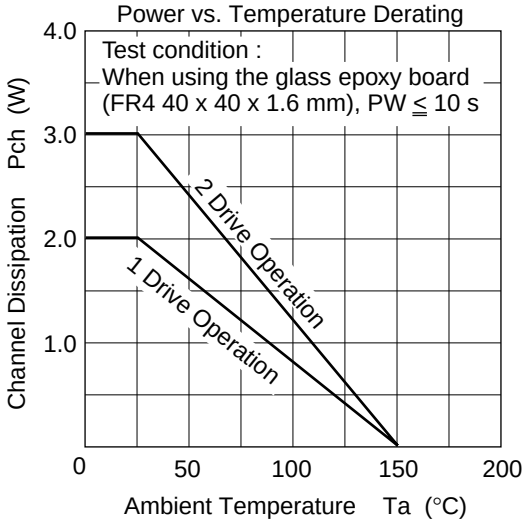
Electrical Characteristics (Ta = 25°C)

Item		Symbol	Min	Typ	Max	Unit	Test conditions
Drain to source breakdown voltage		$V_{(BR)DSS}$	100	—	—	V	I_D = 10 mA, V_{GS} = 0
Gate to source breakdown voltage		$V_{(BR)GSS}$	±20	—	—	V	I_G = ±100 µA, V_{DS} = 0
Zero gate voltage	HAT2058R	I_{DSS}	—	—	1	µA	V_{DS} = 100 V, V_{GS} = 0
drain current	HAT2058RJ	I_{DSS}	—	—	0.1	µA	
Zero gate voltage	HAT2058R	I_{DSS}	—	—	—	µA	V_{DS} = 80 V, V_{GS} = 0
drain current	HAT2058RJ	I_{DSS}	—	—	10	µA	Ta = 125°C
Gate to source cutoff voltage		I_{GSS}	—	—	±10	µA	V_{GS} = ±16 V, V_{DS} = 0
Static drain to source on state resistance		$V_{GS(off)}$	1.0	—	2.5	V	V_{DS} = 10 V, I_D = 1 mA
Forward transfer admittance		$\|y_{fs}\|$	3	5	—	S	I_D = 2 A*[1], V_{DS} = 10 V
Static drain to source on state		$R_{DS(on)}$	—	120	145	mΩ	I_D = 2 A*[1], V_{GS} = 10 V
resistance		$R_{DS(on)}$	—	150	180	mΩ	I_D = 2 A*[1], V_{GS} = 4 V
Input capacitance		Ciss	—	420	—	pF	V_{DS} = 10 V, V_{GS} = 0
Output capacitance		Coss	—	180	—	pF	f = 1 MHz
Reverse transfer capacitance		Crss	—	100	—	pF	
Turn-on delay time		td(on)	—	10	—	ns	V_{GS} = 10 V, I_D = 2 A
Rise time		tr	—	30	—	ns	V_{DD} ≅ 30 V
Turn-off delay time		td(off)	—	110	—	ns	
Fall time		tf	—	60	—	ns	
Body-drain diode forward voltage		V_{DF}	—	0.85	1.1	V	I_F = 4 A, V_{GS} = 0*[1]
Body-drain diode reverse recovery time		trr	—	75	—	ns	I_F = 4 A, V_{GS} = 0 diF/dt = 50 A/µs

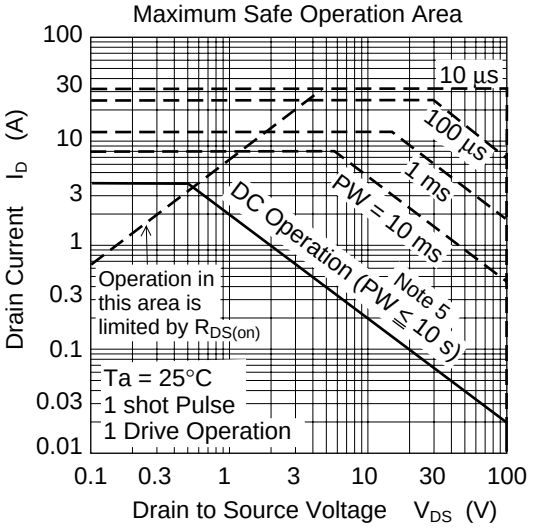
Note: 1. Pulse test

Main Characteristics

Power vs. Temperature Derating

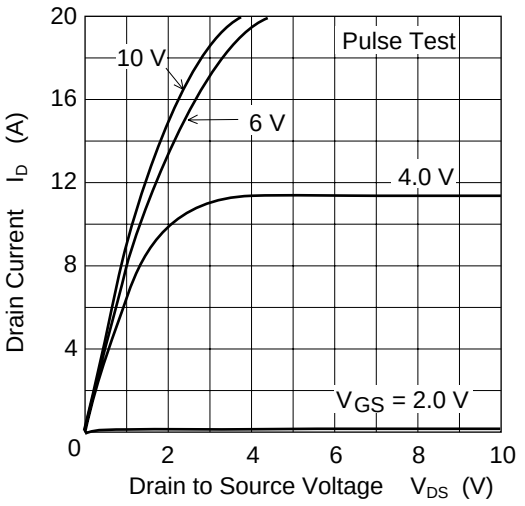


Maximum Safe Operation Area

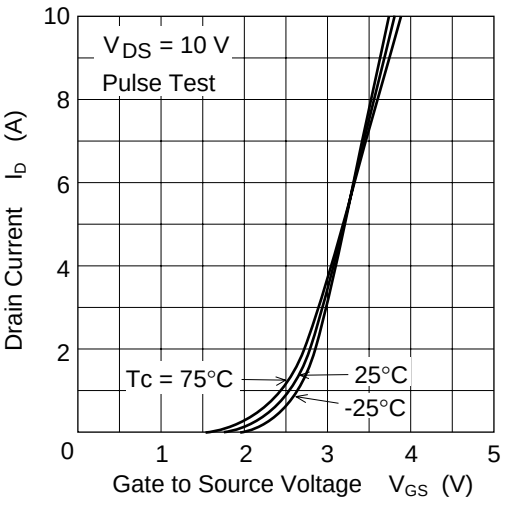


Note 6:
When using the glass epoxy board
(FR4 40 x 40 x 1.6 mm)

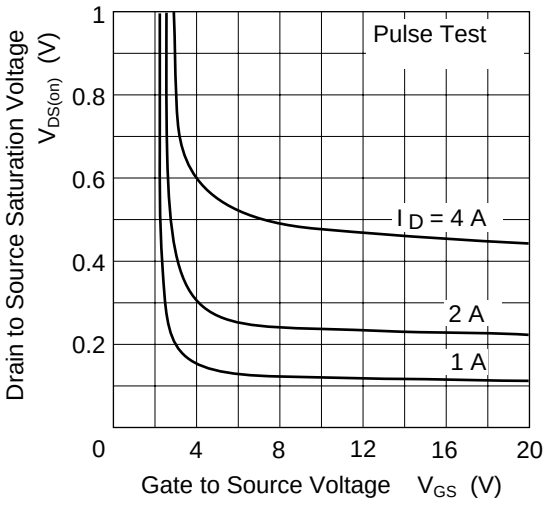
Typical Output Characteristics



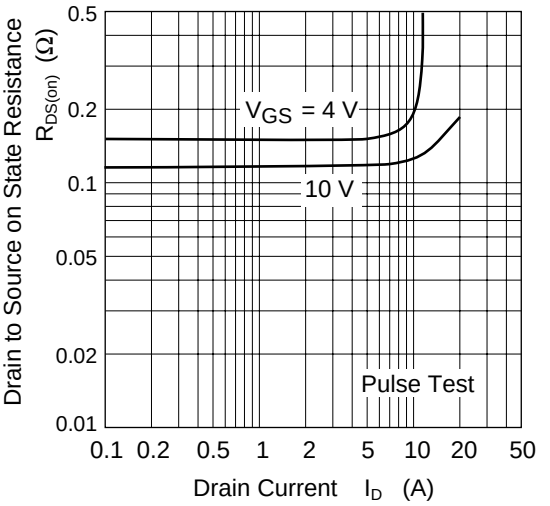
Typical Transfer Characteristics



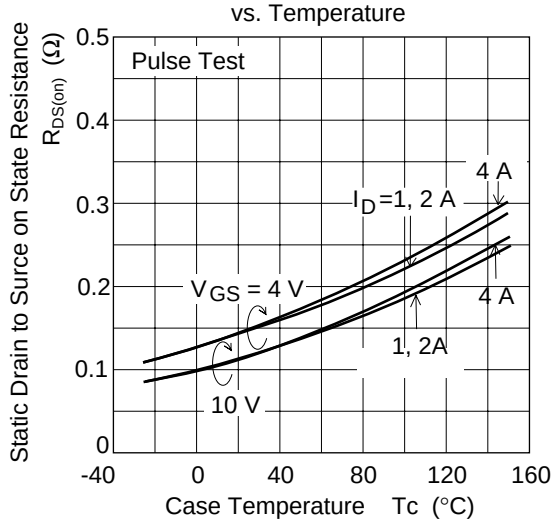
Drain to Source Saturation Voltage vs. Gate to Source Voltage



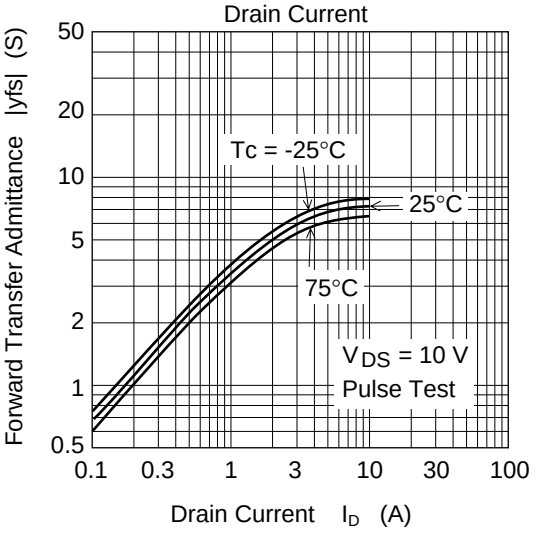
Static Drain to Source on State Resistance vs. Drain Current



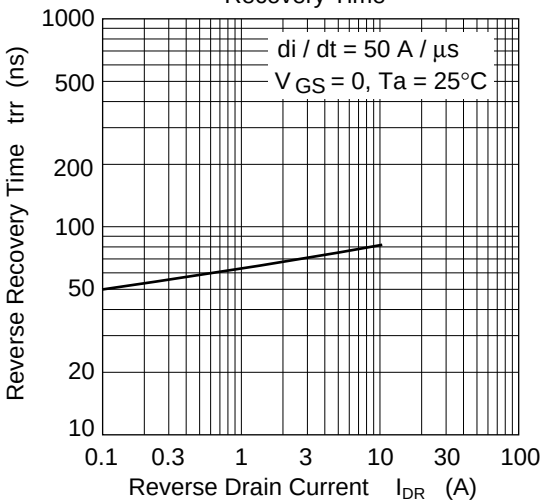
Static Drain to Source on State Resistance vs. Temperature



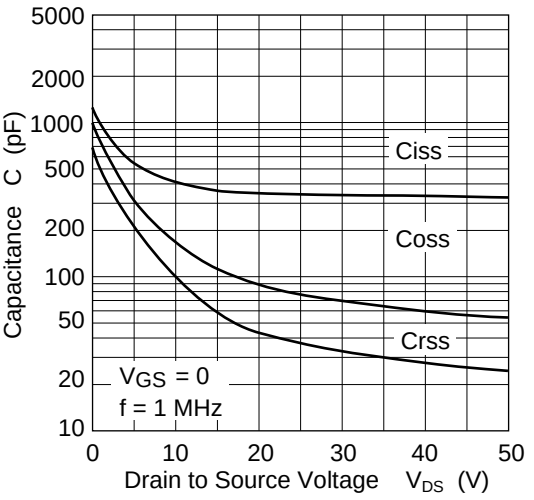
Forward Transfer Admittance vs. Drain Current



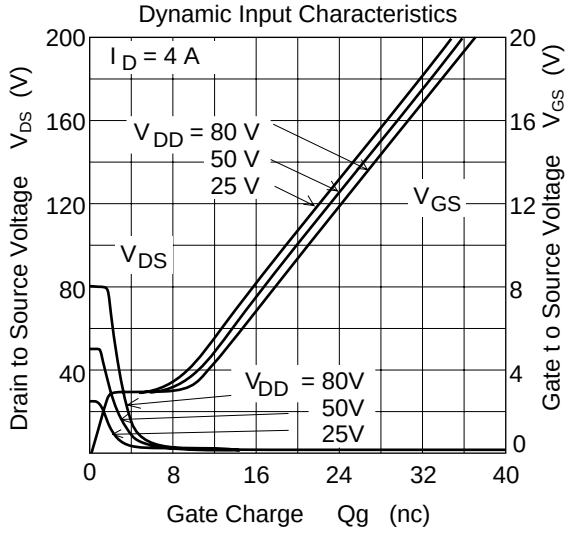
Body-Drain Diode Reverse Recovery Time



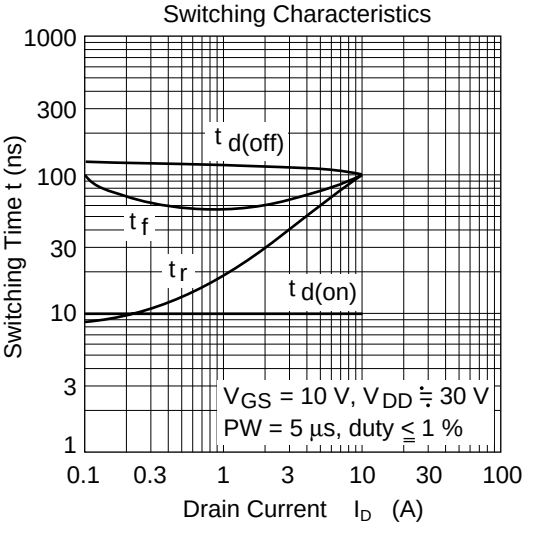
Typical Capacitance vs. Drain to Source Voltage



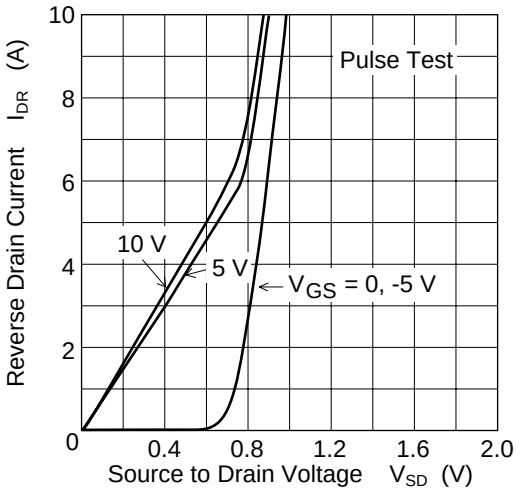
Dynamic Input Characteristics



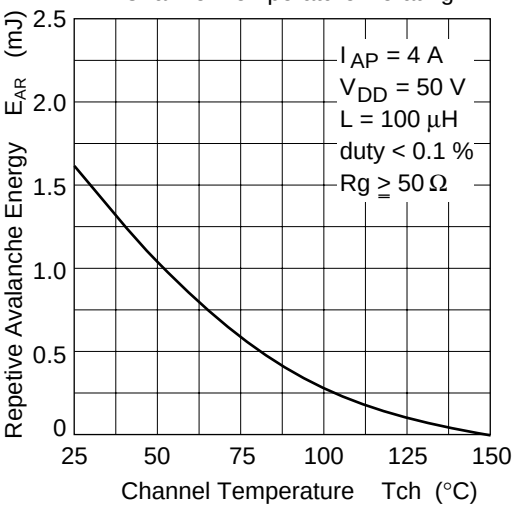
Switching Characteristics



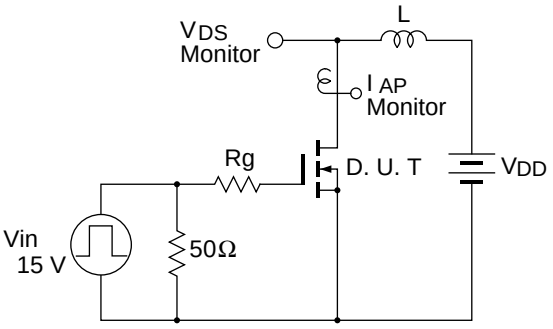
Reverse Drain Current vs.
Source to Drain Voltage



Maximum Avalanche Energy vs.
Channel Temperature Derating

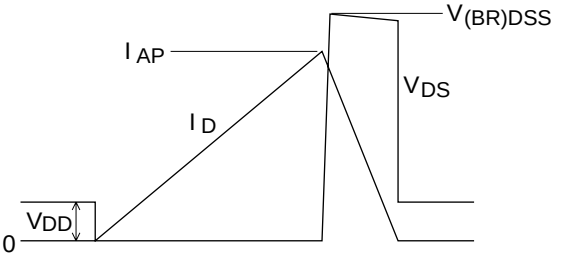


Avalanche Test Circuit

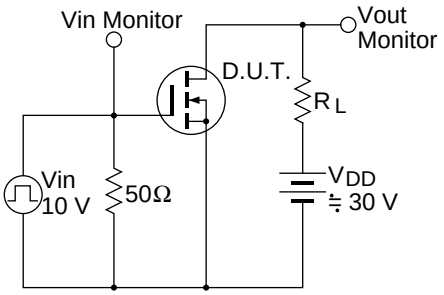


Avalanche Waveform

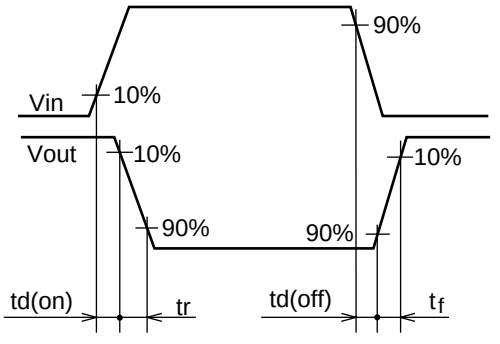
$$E_{AR} = \frac{1}{2} \bullet L \bullet I_{AP}^{2} \bullet \frac{V_{DSS}}{V_{DSS} - V_{DD}}$$



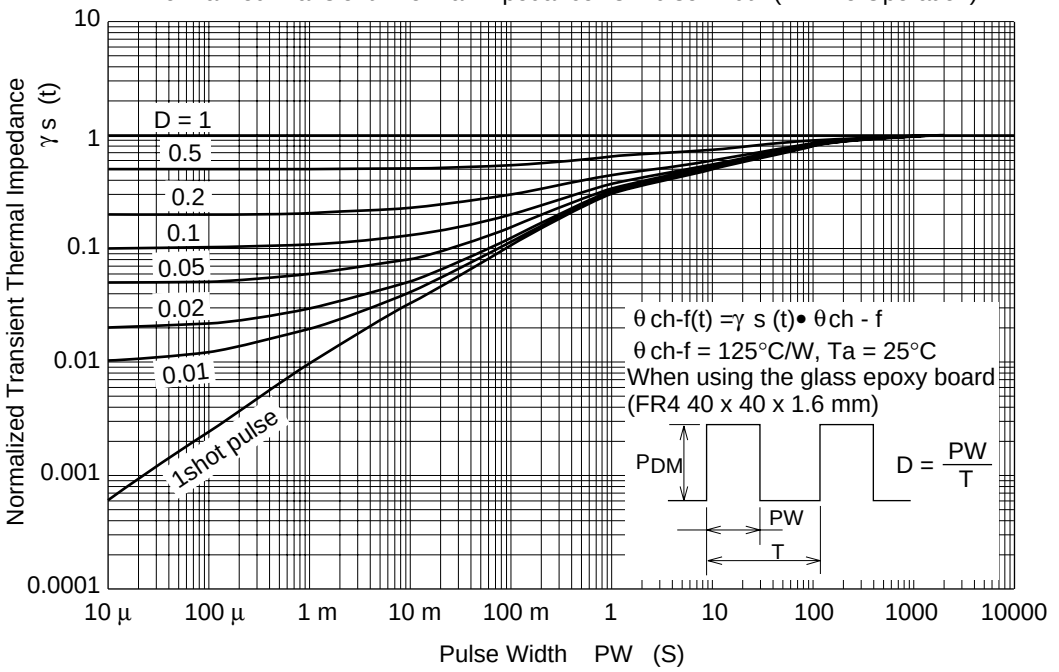
Switching Time Test Circuit



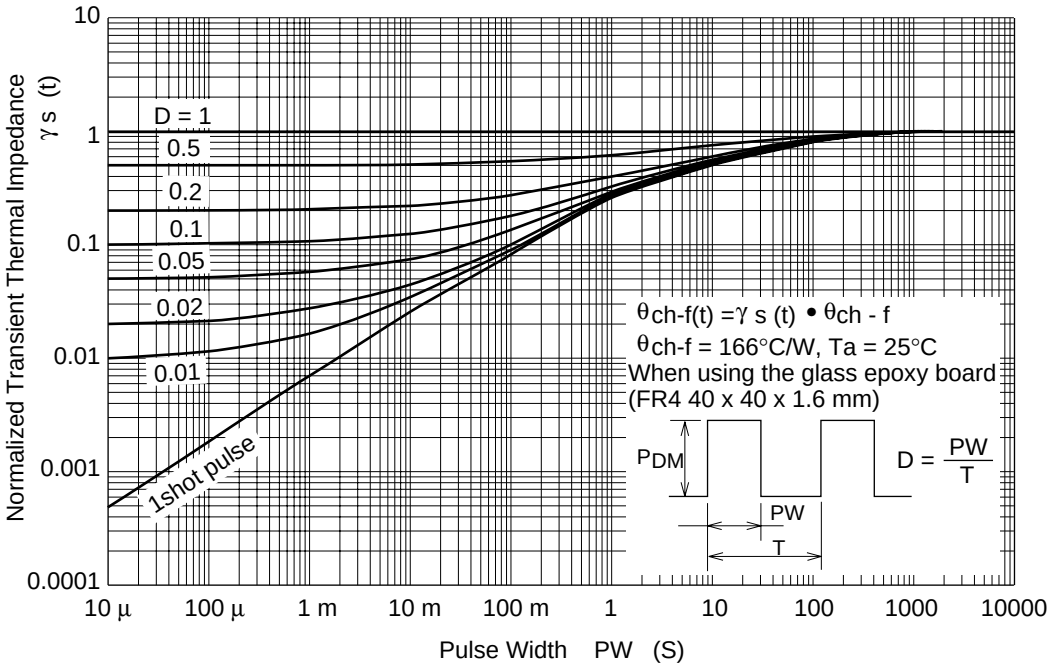
Switching Time Waveform



Normalized Transient Thermal Impedance vs. Pulse Width (1 Drive Operation)

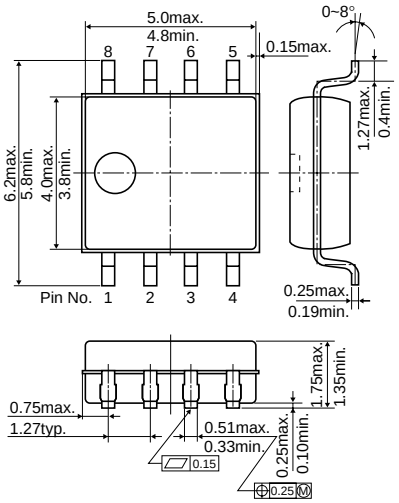


Normalized Transient Thermal Impedance vs. Pulse Width (2 Drive Operation)



Package Dimensions

Unit: mm



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