

N-Channel Power MOSFET

60V, 8A, 36mΩ

FEATURES

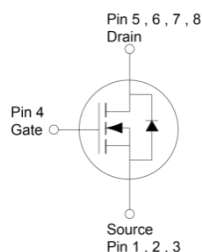
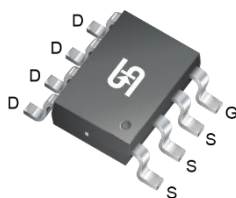
- Advance trench process technology
- High density cell design for ultra low on-resistance
- RoHS Compliant
- Halogen-free

APPLICATIONS

- High-Side DC/DC conversion
- Notebook
- Industrial

KEY PERFORMANCE PARAMETERS

PARAMETER		VALUE	UNIT
V_{DS}		60	V
$R_{DS(on)}$ (max)	$V_{GS} = 10V$	36	mΩ
	$V_{GS} = 4.5V$	43	
Q_g		10	nC


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Note: MSL 1 (Moisture Sensitivity Level) per J-STD-020

ABSOLUTE MAXIMUM RATINGS ($T_A = 25^\circ\text{C}$ unless otherwise noted)

PARAMETER		SYMBOL	LIMIT	UNIT
Drain-Source Voltage		V_{DS}	60	V
Gate-Source Voltage		V_{GS}	± 20	V
Continuous Drain Current	$T_C = 25^\circ\text{C}$	I_D	8	A
Pulsed Drain Current		I_{DM}	25	A
Single Pulse Avalanche Current (Note 1)		I_{AS}	12	A
Single Pulse Avalanche Energy (Note 1)		E_{AS}	22.7	mJ
Total Power Dissipation	$T_A = 25^\circ\text{C}$	P_D	2.5	W
	$T_A = 70^\circ\text{C}$		1.6	
Operating Junction and Storage Temperature Range		T_J, T_{STG}	-55 to +150	$^\circ\text{C}$

THERMAL PERFORMANCE

PARAMETER	SYMBOL	LIMIT	UNIT
Junction to Case Thermal Resistance	$R_{\theta JC}$	25	$^\circ\text{C/W}$
Junction to Ambient Thermal Resistance	$R_{\theta JA}$	50	$^\circ\text{C/W}$

Notes:

Device on a PCB FR4 with 1 in² (single layer, 2 oz thickness) copper area for drain connection.

ELECTRICAL SPECIFICATIONS (T _A = 25°C unless otherwise noted)						
PARAMETER	CONDITIONS	SYMBOL	MIN	TYP	MAX	UNIT
Static						
Drain-Source Breakdown Voltage	V _{GS} = 0V, I _D = 250μA	BV _{DSS}	60	--	--	V
Gate Threshold Voltage	V _{DS} = V _{GS} , I _D = 250μA	V _{GS(TH)}	1	1.6	3	V
Gate-Source Leakage Current	V _{GS} = ± 20V, V _{DS} = 0V	I _{GSS}	--	--	±100	nA
Drain-Source Leakage Current	V _{DS} = 60V, V _{GS} = 0V	I _{DSS}	--	--	2	μA
Drain-Source On-State Resistance (Note 2)	V _{GS} = 10V, I _D = 4.6A	R _{DS(on)}	--	29	36	mΩ
	V _{GS} = 4.5V, I _D = 4.2A		--	33	43	
Forward Transconductance (Note 2)	V _{DS} = 15V, I _D = 4.5A	g _{fs}	--	28	--	S
Dynamic						
Total Gate Charge	V _{DS} = 30V, I _D = 4.6A, V _{GS} = 4.5V	Q _g	--	10	16	nC
Gate-Source Charge		Q _{gs}	--	2.7	--	
Gate-Drain Charge		Q _{gd}	--	4.6	--	
Input Capacitance	V _{DS} = 30V, V _{GS} = 0V, f = 1.0MHz	C _{iss}	--	1216	--	pF
Output Capacitance		C _{oss}	--	59	--	
Reverse Transfer Capacitance		C _{rss}	--	42	--	
Gate Resistance	f = 1.0MHz	R _g	--	1.4	--	Ω
Switching (Note 3)						
Turn-On Delay Time	V _{DD} = 30V, R _G = 1Ω, I _D = 5.6A, V _{GS} = 10V	t _{d(on)}	--	6.9	15	ns
Turn-On Rise Time		t _r	--	15	25	
Turn-Off Delay Time		t _{d(off)}	--	20	40	
Turn-Off Fall Time		t _f	--	2	15	
Source-Drain Diode						
Forward Voltage (Note 2)	I _S = 2A, V _{GS} = 0V	V _{SD}	--	0.8	1.2	V
Reverse Recovery Time	I _S = 4.6A,	t _{rr}	--	15	--	ns
Reverse Recovery Charge	di/dt = 100A/μs	Q _{rr}	--	12	--	nC

Notes:

1. $L = 0.3mH, V_{GS} = 10V, V_{DD} = 30V, R_G = 25\Omega$, Starting $T_J = 25^\circ\text{C}$.
2. Pulse test: Pulse Width $\leq 300\mu s$, duty cycle $\leq 2\%$.
3. Switching time is essentially independent of operating temperature.

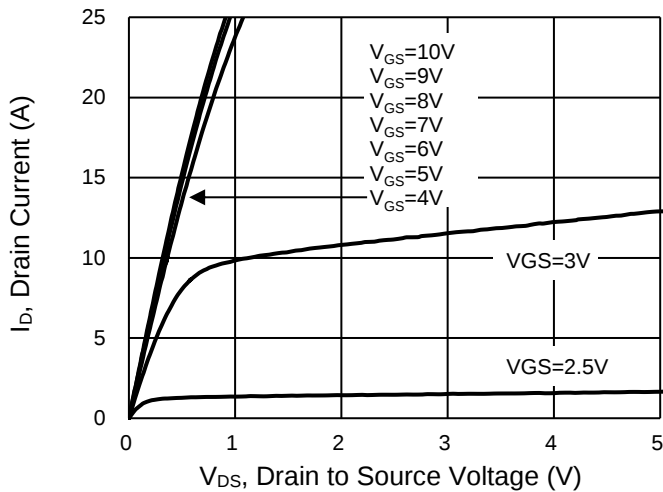
ORDERING INFORMATION

ORDERING CODE	PACKAGE	PACKING
TSM4436CS RLG	SOP-8	2500pcs / 13" Reel

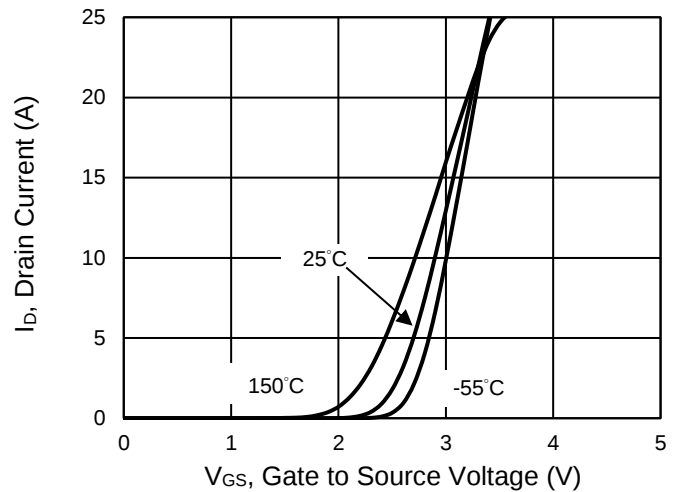
CHARACTERISTICS CURVES (N-Channel)

($T_A = 25^\circ\text{C}$ unless otherwise noted)

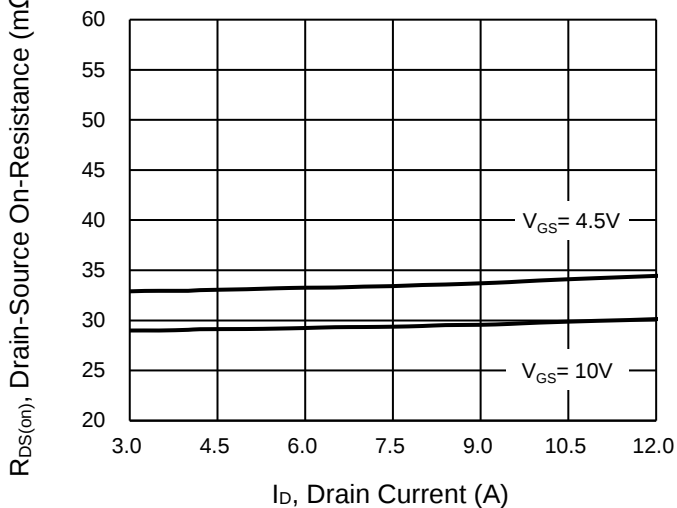
Output Characteristics



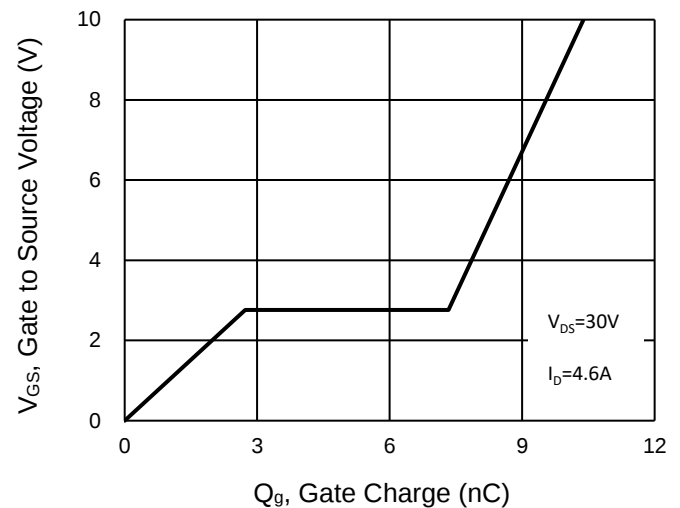
Transfer Characteristics



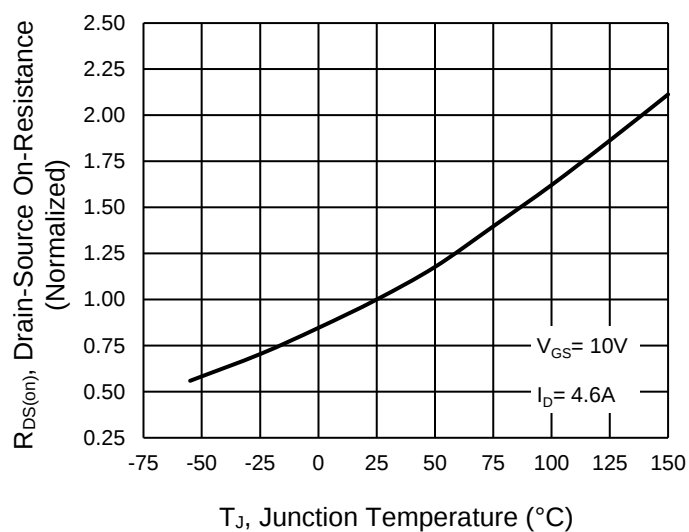
On-Resistance vs. Drain Current



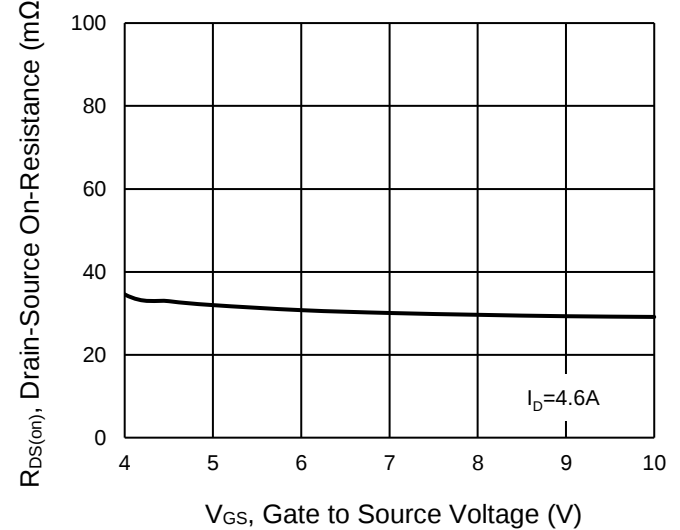
Gate-Source Voltage vs. Gate Charge



On-Resistance vs. Junction Temperature

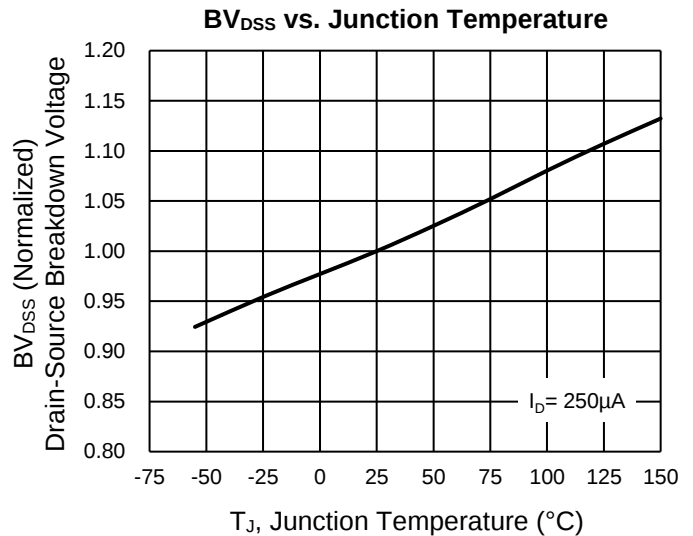
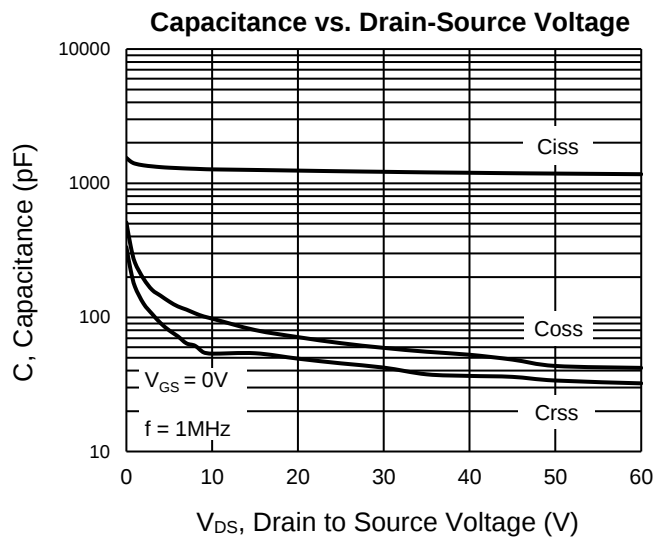


On-Resistance vs. Gate-Source Voltage

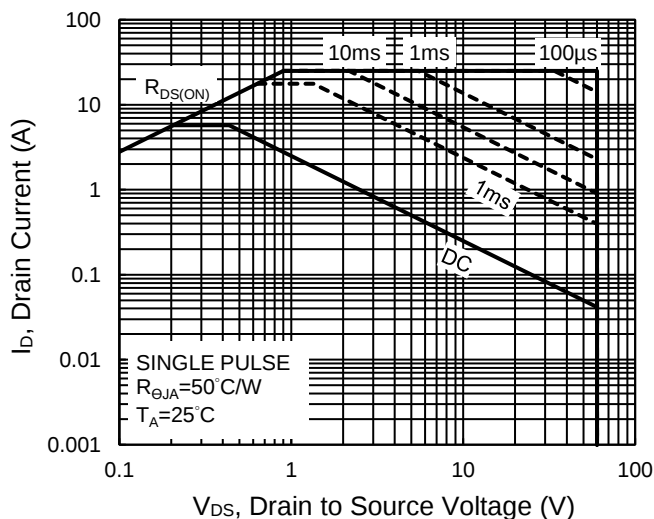


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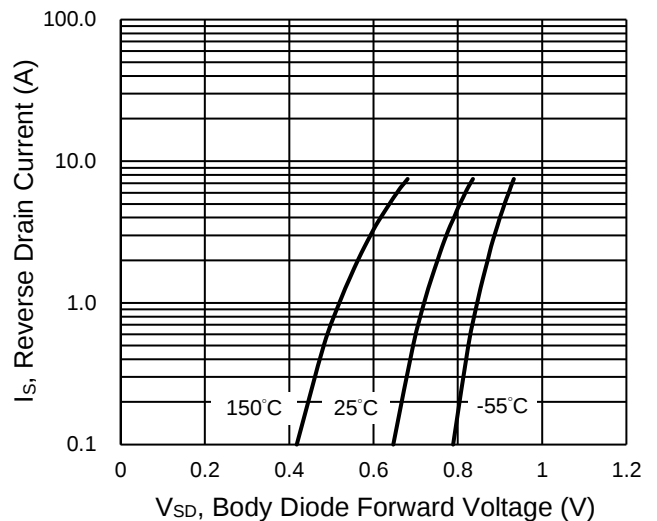
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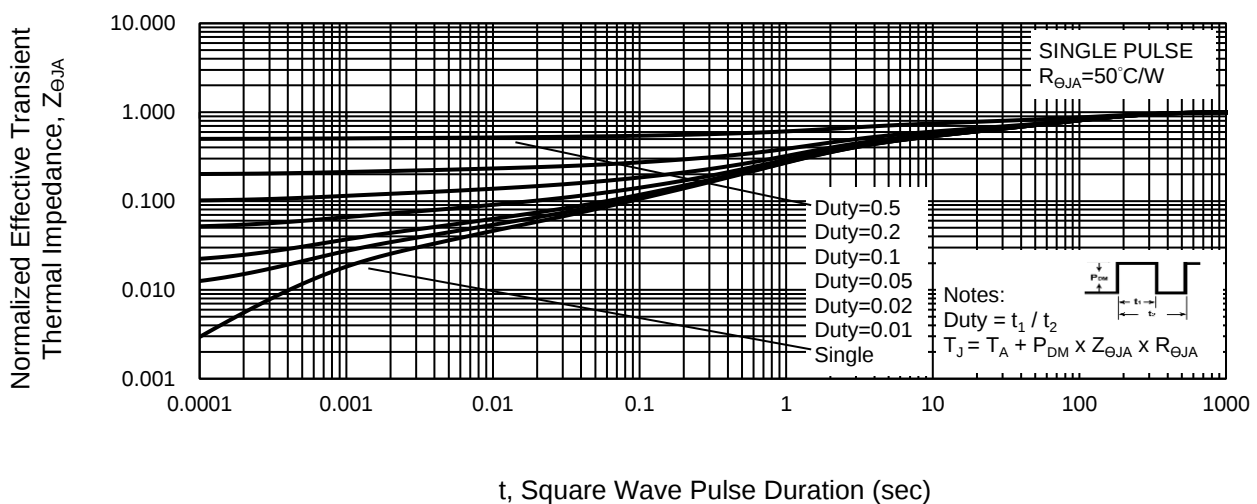
Maximum Safe Operating Area, Junction-to-Ambient



Source-Drain Diode Forward Current vs. Voltage

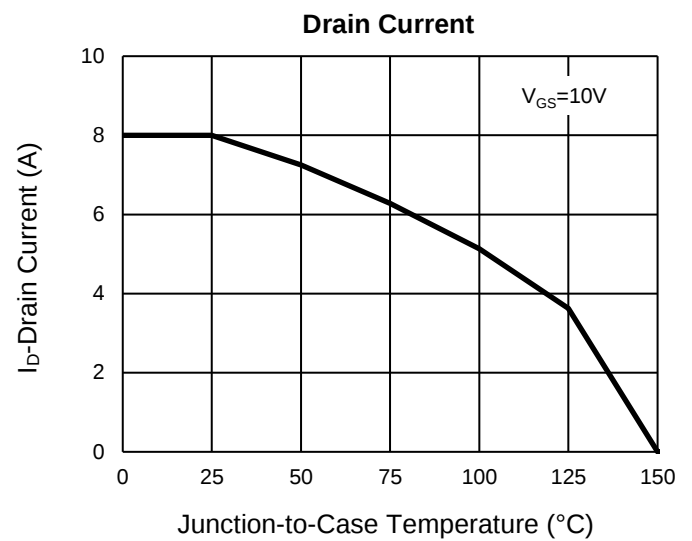
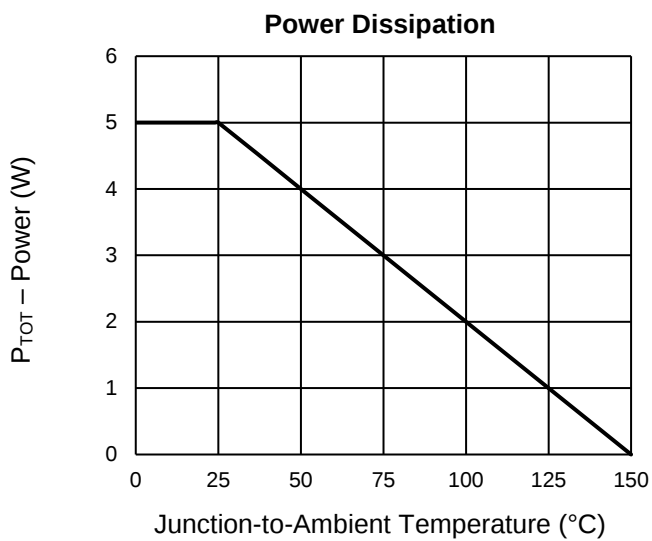


Normalized Thermal Transient Impedance, Junction-to-Ambient

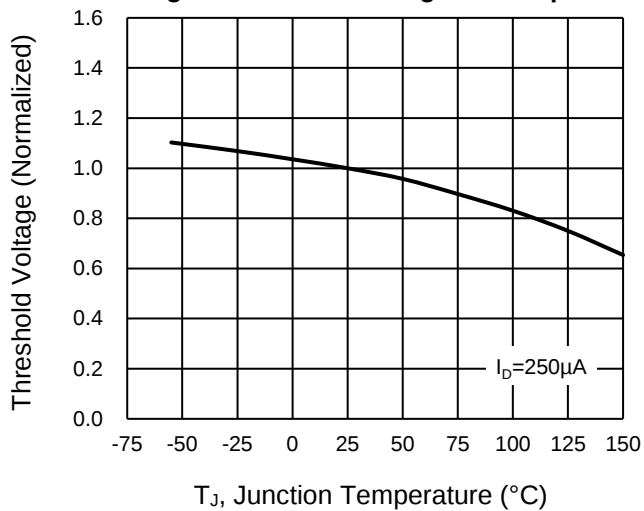


CHARACTERISTICS CURVES (N-Channel)

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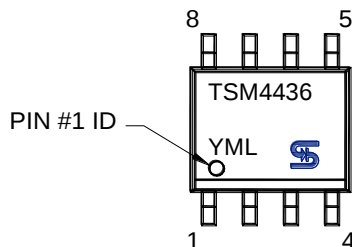
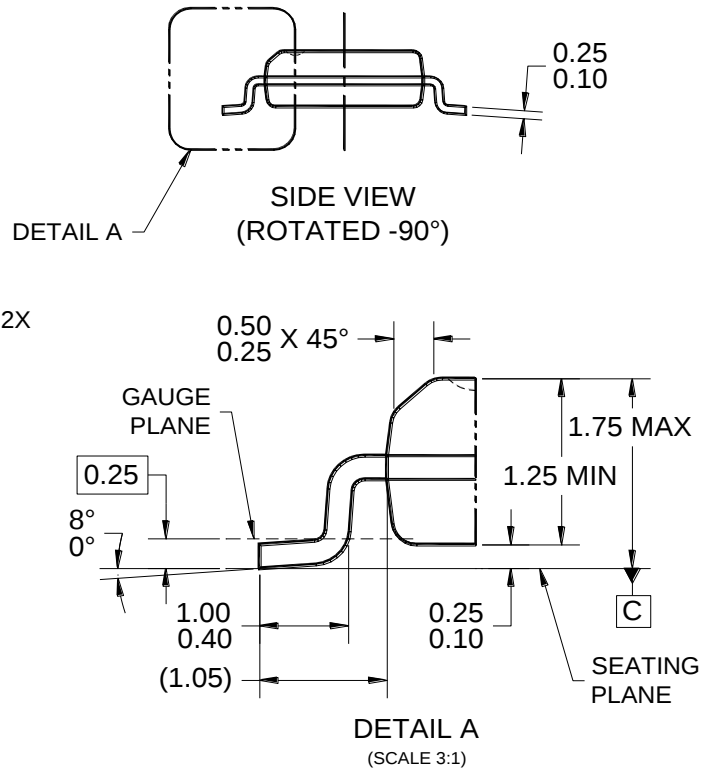
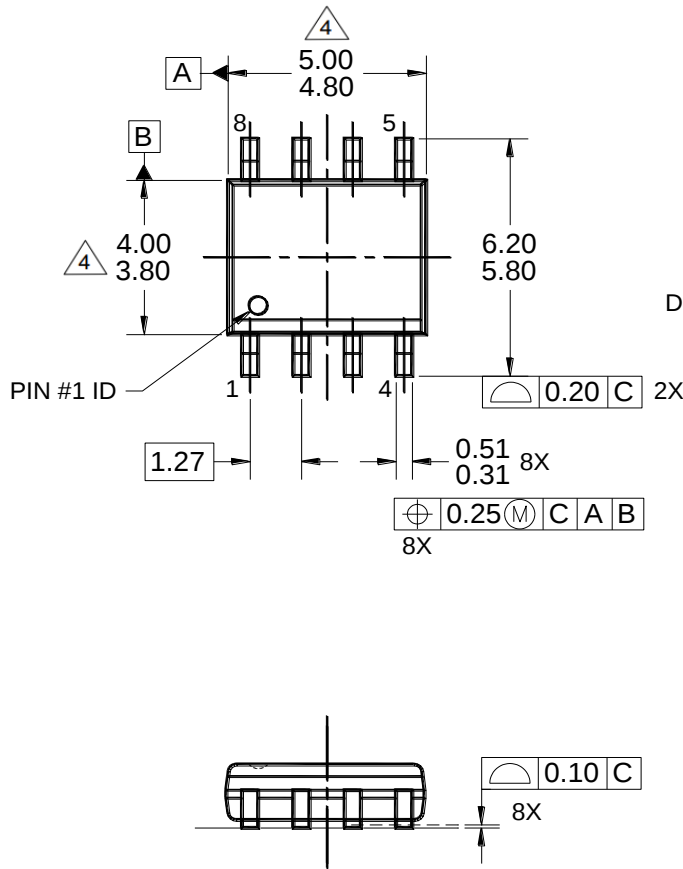


Normalized gate threshold voltage vs Temperature



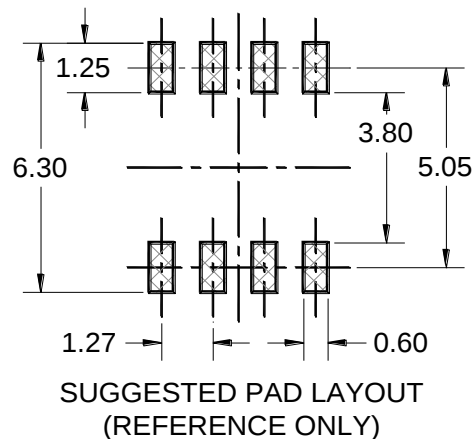
PACKAGE OUTLINE DIMENSIONS (Unit: Millimeters)

SOP-8



MARKING DIAGRAM

Y = Year Code
M = Month Code for Halogen Free Product
O = Jan P = Feb Q = Mar R = Apr
S = May T = Jun U = Jul V = Aug
W = Sep X = Oct Y = Nov Z = Dec
L = Lot Code



NOTES: UNLESS OTHERWISE SPECIFIED

- ALL DIMENSIONS ARE IN MILLIMETERS.
- DIMENSIONING AND TOLERANCING PER ASME Y14.5M-1994.
- PACKAGE OUTLINE REFERENCE: JEDEC MS-012, ISSUE G, VARIATION AA.
- MOLDED PLASTIC BODY DIMENSIONS DO NOT INCLUDE MOLD FLASH, PROTRUSIONS OR GATE BURRS.
- DWG NO REF: HQ2SD07-SOP8STD-028 REV A.

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