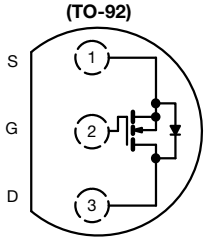
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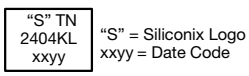
N-Channel 240 V (D-S) MOSFET

TO-226AA (TO-92)



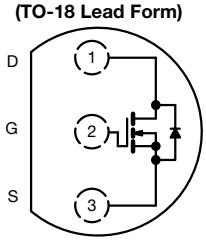
Top View
TN2404KL

Device Marking Front View



"S" = Siliconix Logo
xxyy = Date Code

TO-92-18RM (TO-18 Lead Form)



Top View
BS107KL

Device Marking Front View



"S" = Siliconix Logo
xxyy = Date Code

FEATURES

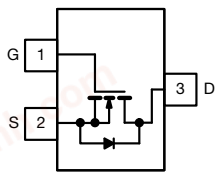
- Low on-resistance: 4 Ω
- Secondary breakdown free: 260 V
- Low power / voltage driven
- Low input and output leakage
- Excellent thermal stability
- Material categorization: for definitions of compliance please see www.vishay.com/doc?99912

Pb-free
RoHS COMPLIANT
HALOGEN FREE

APPLICATIONS

- High-voltage drivers: relays, solenoids, lamps, hammers, displays, transistors, etc.
- Telephone mute switches, ringer circuits
- Power Supply, Converters
- Motor Control

TO-236 (SOT-23)



Top View
TN2404K

Marking Code: K1ywl
K1 = Part Number Code for TN2404K
y = Year Code
w = Week Code
l = Lot Traceability

BENEFITS

- Low offset voltage
- Full-voltage operation
- Easily driven without buffer
- Low error voltage
- No high-temperature ''Run-Away''

PRODUCT SUMMARY		
PART NUMBER	**TN2404K**	**TN2404K, BS107KL**
V_{DS} (V)	240	
$R_{DS(on)}$ max. (Ω) at V_{GS} = 10 V	4	
Q_g typ. (nC)	4.87	
I_D (A) [a, e]	0.2	0.3
Configuration	Single	

ORDERING INFORMATION			
Package	TO-236 (SOT-23)	TO-226AA (TO-92)	TO-92-18RM (TO-18 Lead Form)
Lead (Pb)-free	TN2404K-T1-E3		
Lead (Pb)-free and halogen-free	TN2404K-T1-GE3		
Tape and Reel		TN2404KL-TR1-E3	BS107KL-TR1-E3
Alternate manufacturing location	TN2404K-T1-BE3		

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ABSOLUTE MAXIMUM RATINGS (T_A = 25 °C, unless otherwise noted)					
PARAMETER		**SYMBOL**	**TN2404K**	**TN2404KL/BS107KL**	**SYMBOL**
Drain-source voltage		V_{DS}	240		V
Gate-source voltage		V_{GS}	± 20		
Continuous drain current (T_J = 150 °C)	T_A = 25 °C	I_D	0.2	0.3	A
	T_A = 70 °C		0.16	0.25	
Pulsed drain current (t = 300 µs)		I_{DM}	0.8	1.4	
Maximum power dissipation	T_A = 25 °C	P_D	0.36	0.8	W
	T_A = 70 °C		0.23	0.51	
Thermal resistance junction-to-ambient		R_{thJA}	350b	156	°C/W
Operating junction and storage temperature range		T_J, T_{stg}	- 55 to 150		°C

Notes

a. Pulse width limited by maximum junction temperature
b. Surface mounted on an FR4 board

SPECIFICATIONS (T_A = 25 °C, unless otherwise noted)						
PARAMETER	**SYMBOL**	**TEST CONDITIONS**	**LIMITS**			
			MIN.	**TYP.** [a]	**MAX.**	**UNIT**
Static						
Drain-source breakdown voltage	V_{DS}	V_{GS} = 0 V, I_D = 100 µA	240	257	-	V
Gate-source threshold voltage	$V_{GS(th)}$	V_{DS} = V_{GS}, I_D = 250 µA	0.8	1.65	2	
Gate-source leakage	I_{GSS}	V_{DS} = 0 V, V_{GS} = ± 20 V	-	-	± 100	nA
Zero gate voltage drain current	I_{DSS}	V_{DS} = 192 V, V_{GS} = 0 V	-	-	1	µA
		V_{DS} = 192 V, V_{GS} = 0 V, T_J = 55 °C	-	-	10	
On-state drain current [a]	$I_{D(on)}$	V_{DS} = 10 V, V_{GS} = 10 V	0.8	-	-	A
		V_{DS} = 10 V, V_{GS} = 4.5 V	0.5	-	-	
Drain-source on-state resistance [a]	$R_{DS(on)}$	V_{GS} = 10 V, I_D = 0.3 A	-	2.2	4	Ω
		V_{GS} = 4.5 V, I_D = 0.2 A	-	2.3	4	
		V_{GS} = 2.5 V, I_D = 0.1 A	-	2.4	6	
Forward transconductance [a]	g_{fs}	V_{DS} = 10 V, I_D = 0.3 A	-	1.6	-	S
Diode forward voltage	V_{SD}	V_{GS} = 0 V, I_S = 0.3 A	-	0.8	1.2	V
Dynamic [b]						
Total gate charge	Q_g	V_{DS} = 192 V, V_{GS} = 10 V, I_D = 0.5 A	-	4.87	8	nC
Gate-source charge	Q_{gs}		-	0.56	-	
Gate-drain charge	Q_{gd}		-	1.53	-	
Turn-on delay time	$t_{d(on)}$	V_{DD} = 60 V, R_L = 200 Ω I_D ≅ 0.3 A, V_{GEN} = 10 V, R_g = 25 Ω	-	5	10	ns
Rise time	t_r		-	12	20	
Turn-off delay time	$t_{d(off)}$		-	35	60	
Fall time	t_f		-	16	25	

Notes

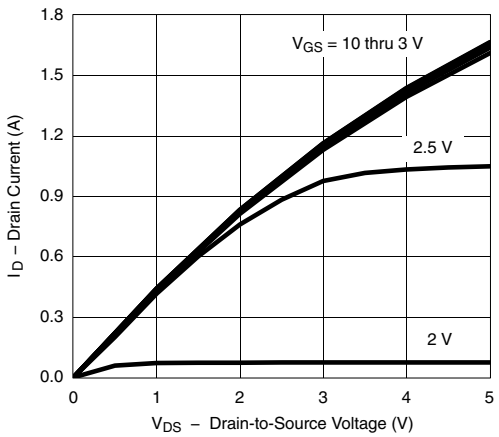
a. Pulse test; pulse width ≤ 300 µs, duty cycle ≤ 2 %
b. Guaranteed by design, not subject to production testing

Stresses beyond those listed under "Absolute Maximum Ratings" may cause permanent damage to the device. These are stress ratings only, and functional operation of the device at these or any other conditions beyond those indicated in the operational sections of the specifications is not implied. Exposure to absolute maximum rating conditions for extended periods may affect device reliability.

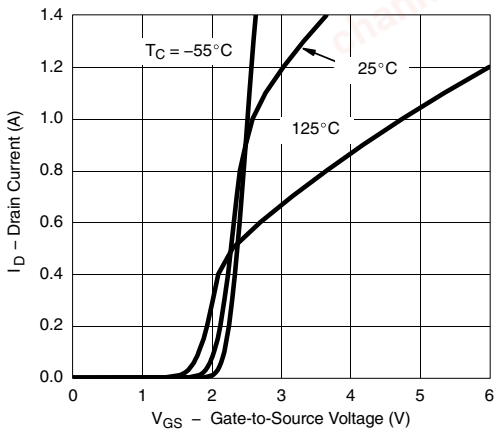
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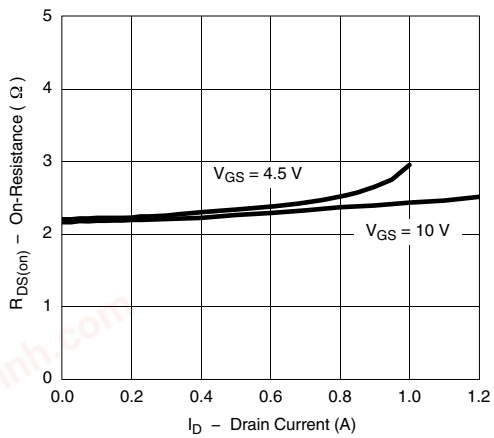
TYPICAL CHARACTERISTICS (25 °C, unless otherwise noted)



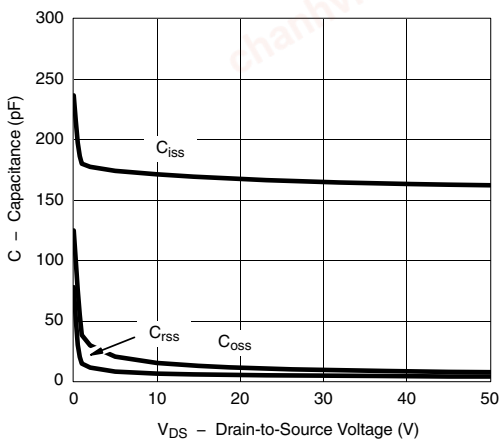
Output Characteristics



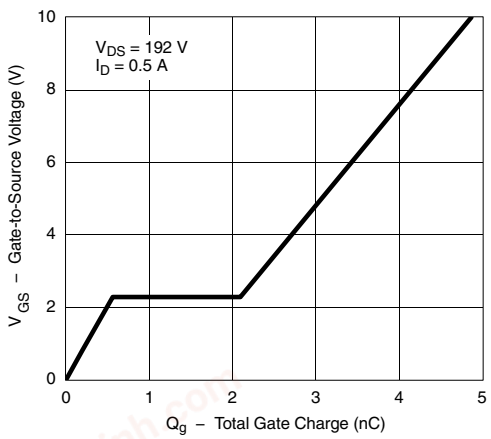
Transfer Characteristics



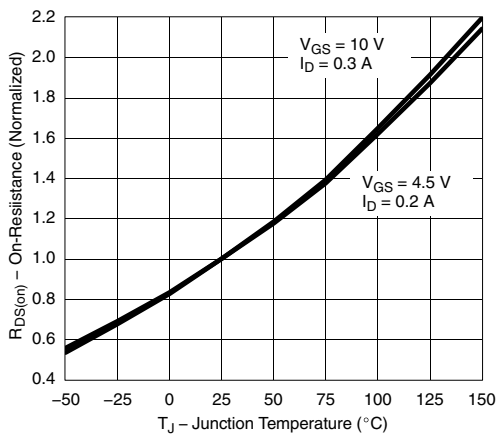
On-Resistance vs. Drain Current



Capacitance



Gate Charge

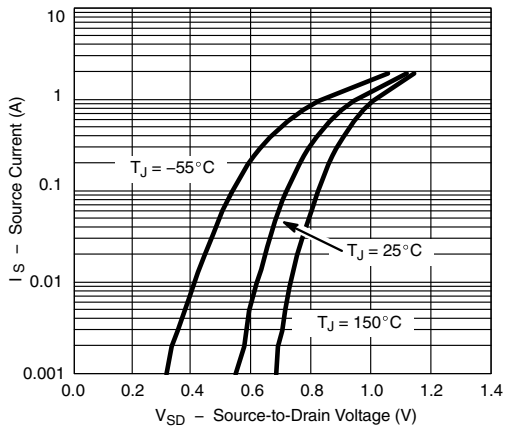


On-Resistance vs. Junction Temperature

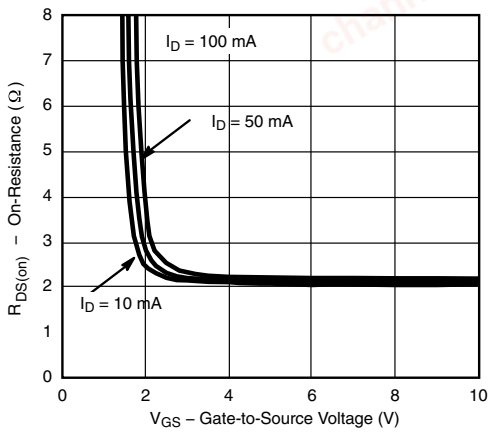
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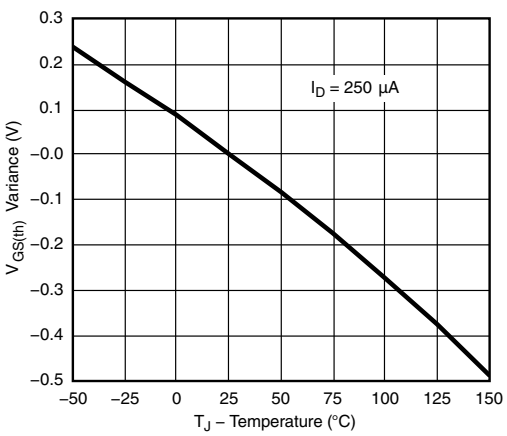
TYPICAL CHARACTERISTICS (25 °C, unless otherwise noted)



Source-Drain Diode Forward Voltage



On-Resistance vs. Gate-to-Source Voltage

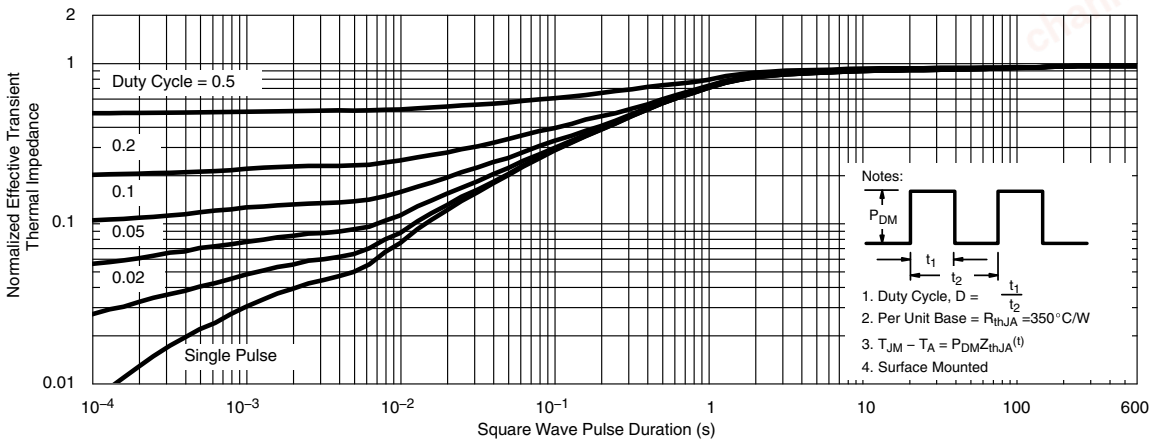


Threshold Voltage

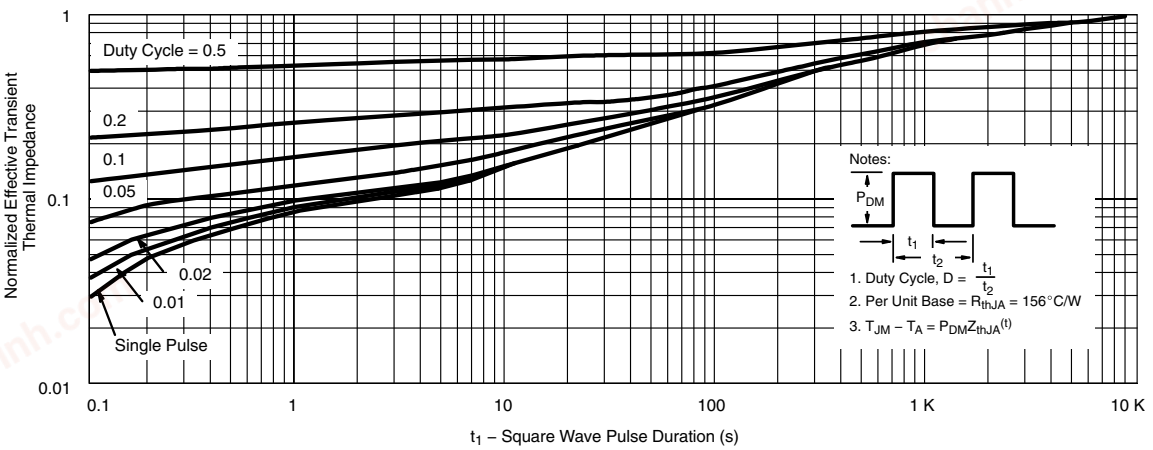
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TYPICAL CHARACTERISTICS (25 °C, unless otherwise noted)



Normalized Thermal Transient Impedance, Junction-to-Ambient
(TO-236, TN2404K only)



Normalized Thermal Transient Impedance, Junction-to-Ambient
(TO-226AA, TN2404KL and TO-92-18RM, BS107KL only)

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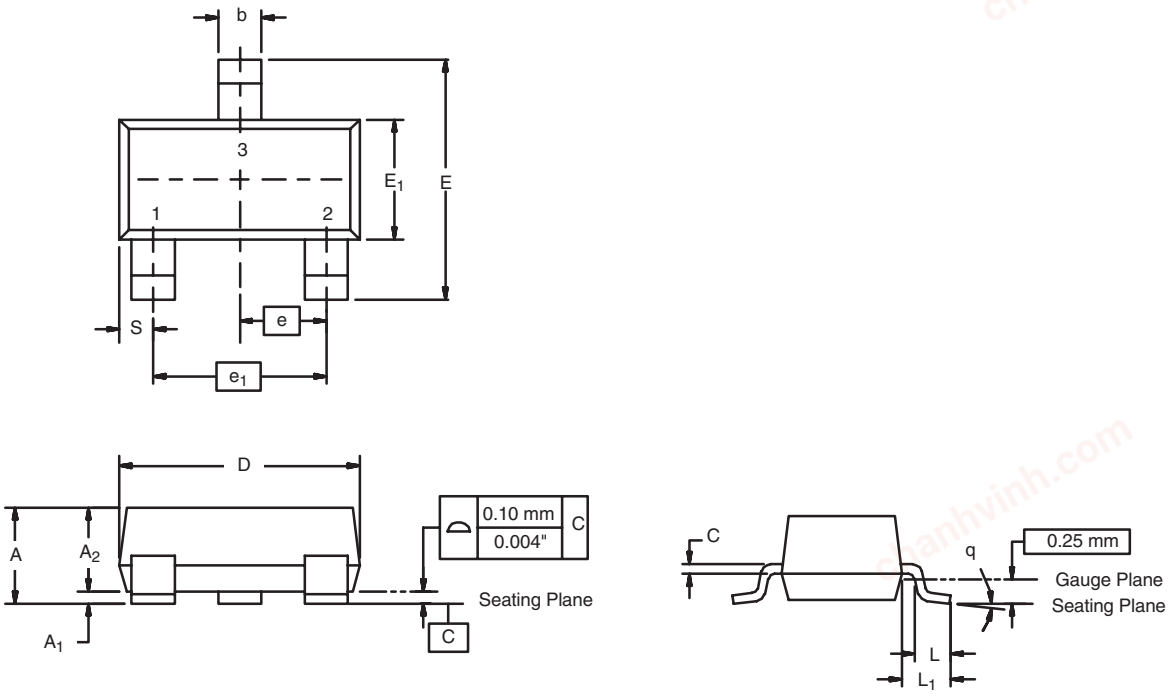
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Package Information

Vishay Siliconix

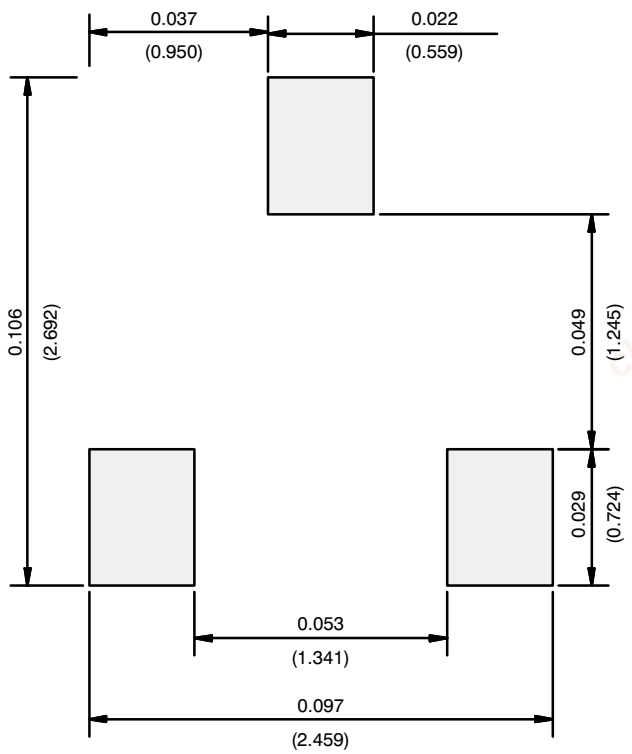
SOT-23 (TO-236): 3-LEAD



Dim	MILLIMETERS		INCHES	
	Min	Max	Min	Max
A	0.89	1.12	0.035	0.044
A_1	0.01	0.10	0.0004	0.004
A_2	0.88	1.02	0.0346	0.040
b	0.35	0.50	0.014	0.020
c	0.085	0.18	0.003	0.007
D	2.80	3.04	0.110	0.120
E	2.10	2.64	0.083	0.104
E_1	1.20	1.40	0.047	0.055
e	0.95 BSC		0.0374 Ref	
e_1	1.90 BSC		0.0748 Ref	
L	0.40	0.60	0.016	0.024
L_1	0.64 Ref		0.025 Ref	
S	0.50 Ref		0.020 Ref	
q	3°	8°	3°	8°
ECN: S-03946-Rev. K, 09-Jul-01 DWG: 5479				

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RECOMMENDED MINIMUM PADS FOR SOT-23



Recommended Minimum Pads
Dimensions in Inches/(mm)

Return to Index

APPLICATION NOTE

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