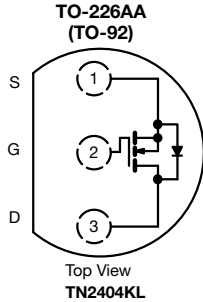
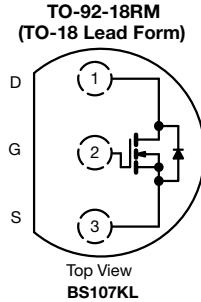


N-Channel 240 V (D-S) MOSFET


 Device Marking
Front View

"S" TN
2404KL
xxyy

"S" = Siliconix Logo
xxyy = Date Code


 Device Marking
Front View

"S" BS
107KL
xxyy

"S" = Siliconix Logo
xxyy = Date Code



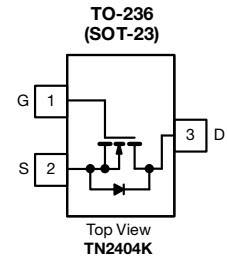
RoHS
COMPLIANT
HALOGEN
FREE

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

APPLICATIONS

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



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		



ABSOLUTE MAXIMUM RATINGS ($T_A = 25\text{ }^\circ\text{C}$, 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 ($T_J = 150\text{ }^\circ\text{C}$)	$T_A = 25\text{ }^\circ\text{C}$	I_D	0.2	0.3	A
	$T_A = 70\text{ }^\circ\text{C}$		0.16	0.25	
Pulsed drain current ($t = 300\text{ }\mu\text{s}$)		I_{DM}	0.8	1.4	
Maximum power dissipation	$T_A = 25\text{ }^\circ\text{C}$	P_D	0.36	0.8	W
	$T_A = 70\text{ }^\circ\text{C}$		0.23	0.51	
Thermal resistance junction-to-ambient		R_{thJA}	350b	156	$^\circ\text{C/W}$
Operating junction and storage temperature range		T_J, T_{stg}	- 55 to 150		$^\circ\text{C}$

Notes

- Pulse width limited by maximum junction temperature
- Surface mounted on an FR4 board

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

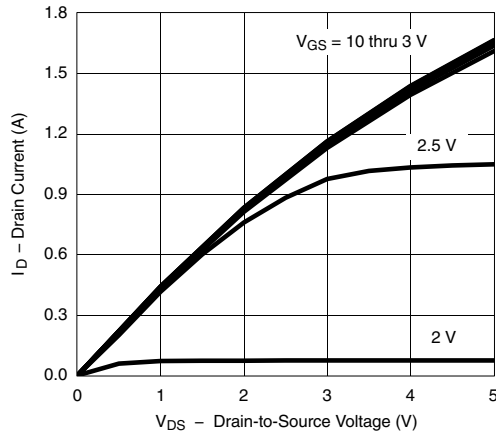
Notes

- Pulse test; pulse width $\leq 300\text{ }\mu\text{s}$, duty cycle $\leq 2\%$
- Guaranteed by design, not subject to production testing

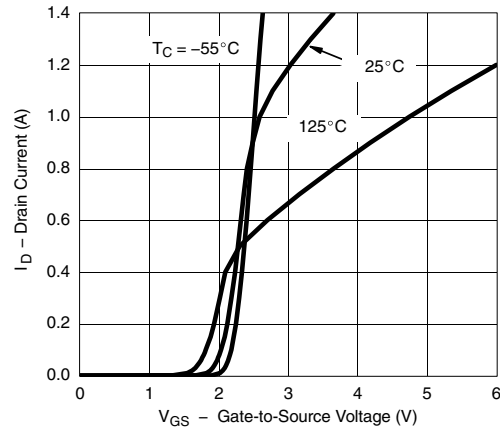
Stresses beyond those listed under "Absolute Maximum Ratings" may cause permanent damage to the device. These are stress ratings only, and functional operation of the device at these or any other conditions beyond those indicated in the operational sections of the specifications is not implied. Exposure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



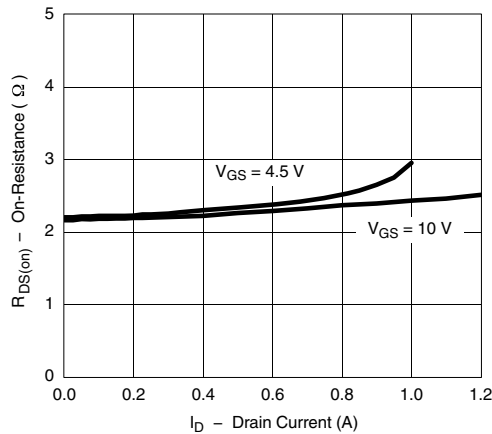
TYPICAL CHARACTERISTICS (25 °C, unless otherwise noted)



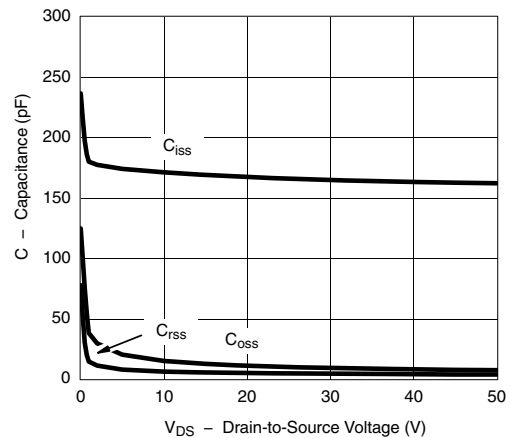
Output Characteristics



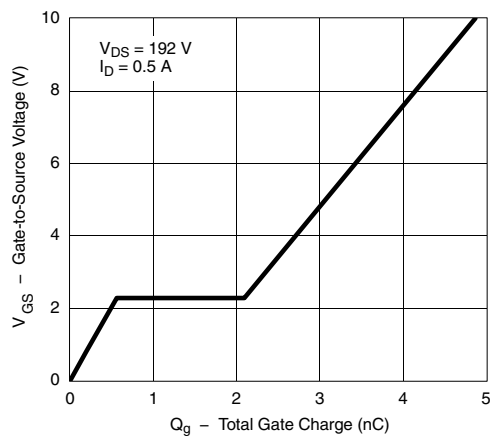
Transfer Characteristics



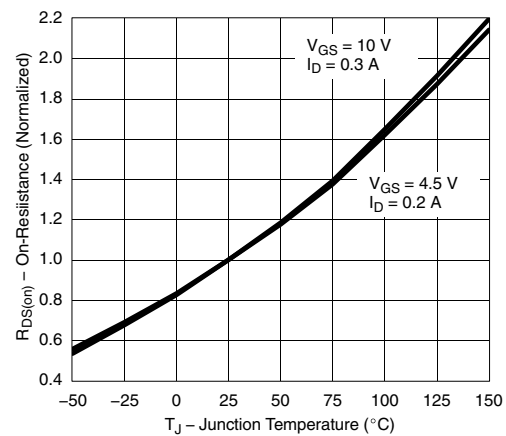
On-Resistance vs. Drain Current



Capacitance



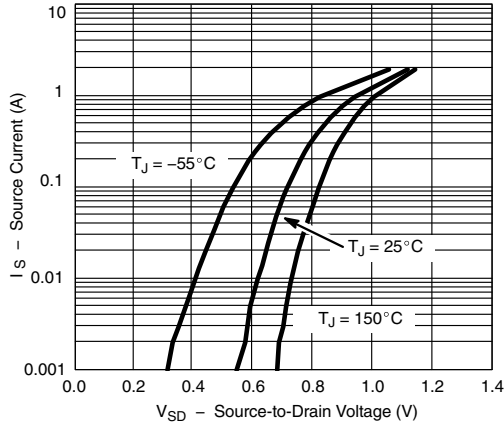
Gate Charge



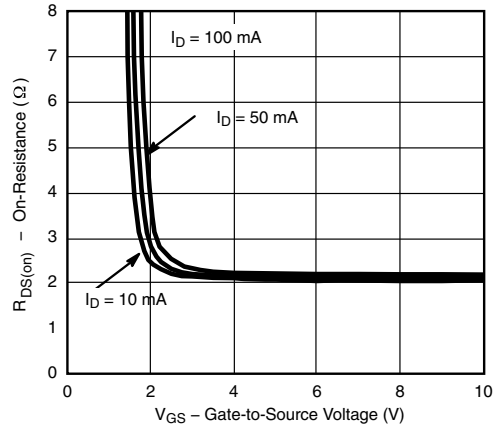
On-Resistance vs. Junction Temperature



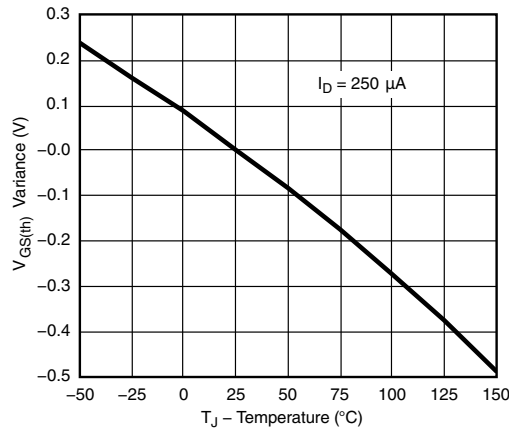
TYPICAL CHARACTERISTICS (25 °C, unless otherwise noted)



Source-Drain Diode Forward Voltage



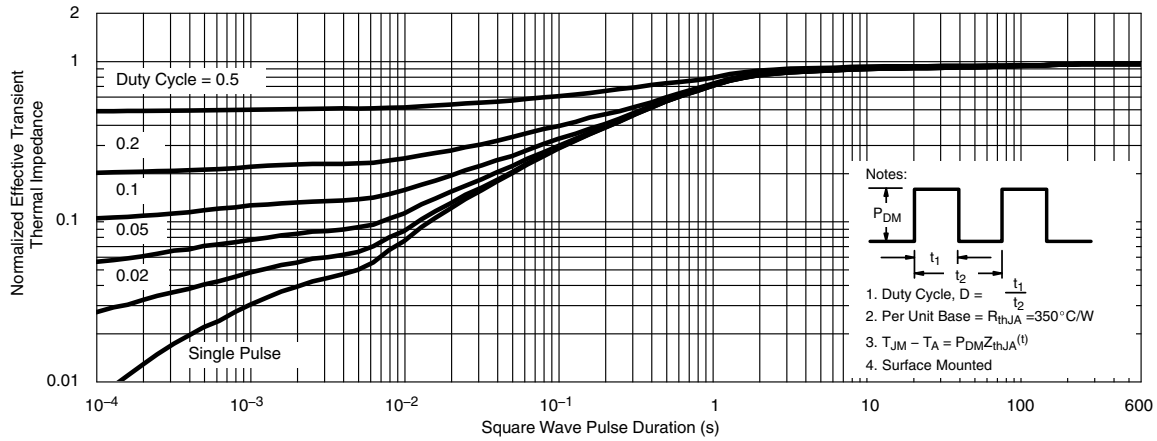
On-Resistance vs. Gate-to-Source Voltage



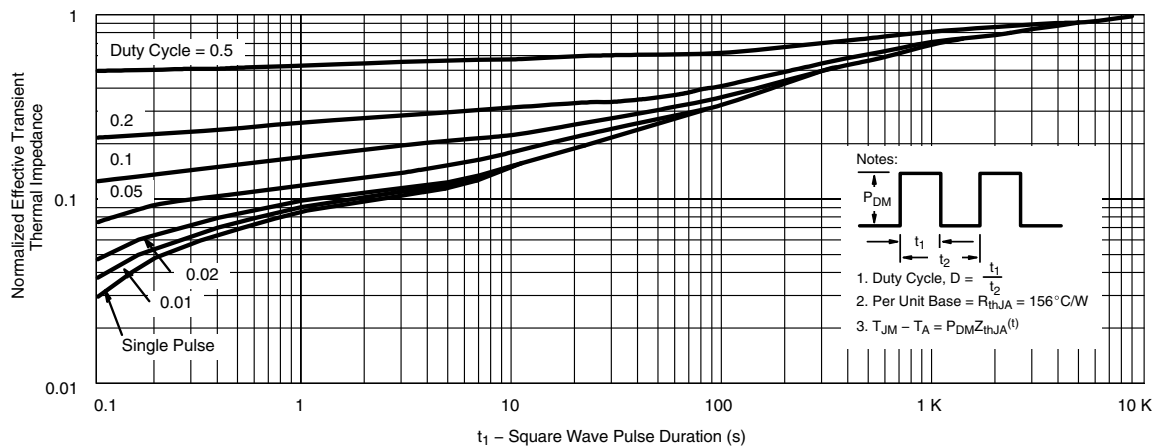
Threshold Voltage



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)

Vishay Siliconix maintains worldwide manufacturing capability. Products may be manufactured at one of several qualified locations. Reliability data for Silicon Technology and Package Reliability represent a composite of all qualified locations. For related documents such as package / tape drawings, part marking, and reliability data, see www.vishay.com/ppg?72225.

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

RECOMMENDED MINIMUM PADS FOR SOT-23



Recommended Minimum Pads
Dimensions in Inches/(mm)

[Return to Index](#)



Disclaimer

ALL PRODUCT, PRODUCT SPECIFICATIONS AND DATA ARE SUBJECT TO CHANGE WITHOUT NOTICE TO IMPROVE RELIABILITY, FUNCTION OR DESIGN OR OTHERWISE.

Vishay Intertechnology, Inc., its affiliates, agents, and employees, and all persons acting on its or their behalf (collectively, "Vishay"), disclaim any and all liability for any errors, inaccuracies or incompleteness contained in any datasheet or in any other disclosure relating to any product.

Vishay makes no warranty, representation or guarantee regarding the suitability of the products for any particular purpose or the continuing production of any product. To the maximum extent permitted by applicable law, Vishay disclaims (i) any and all liability arising out of the application or use of any product, (ii) any and all liability, including without limitation special, consequential or incidental damages, and (iii) any and all implied warranties, including warranties of fitness for particular purpose, non-infringement and merchantability.

Statements regarding the suitability of products for certain types of applications are based on Vishay's knowledge of typical requirements that are often placed on Vishay products in generic applications. Such statements are not binding statements about the suitability of products for a particular application. It is the customer's responsibility to validate that a particular product with the properties described in the product specification is suitable for use in a particular application. Parameters provided in datasheets and / or specifications may vary in different applications and performance may vary over time. All operating parameters, including typical parameters, must be validated for each customer application by the customer's technical experts. Product specifications do not expand or otherwise modify Vishay's terms and conditions of purchase, including but not limited to the warranty expressed therein.

Hyperlinks included in this datasheet may direct users to third-party websites. These links are provided as a convenience and for informational purposes only. Inclusion of these hyperlinks does not constitute an endorsement or an approval by Vishay of any of the products, services or opinions of the corporation, organization or individual associated with the third-party website. Vishay disclaims any and all liability and bears no responsibility for the accuracy, legality or content of the third-party website or for that of subsequent links.

Vishay products are not designed for use in life-saving or life-sustaining applications or any application in which the failure of the Vishay product could result in personal injury or death unless specifically qualified in writing by Vishay. Customers using or selling Vishay products not expressly indicated for use in such applications do so at their own risk. Please contact authorized Vishay personnel to obtain written terms and conditions regarding products designed for such applications.

No license, express or implied, by estoppel or otherwise, to any intellectual property rights is granted by this document or by any conduct of Vishay. Product names and markings noted herein may be trademarks of their respective owners.