



## N-Channel 240-V (D-S) MOSFET

PRODUCT SUMMARY					
Part Number	V <sub>DS</sub> Min (V)	r <sub>DS(on)</sub> (Ω)	V <sub>GS(th)</sub> (V)	I <sub>D</sub> (A)	Q <sub>g</sub> (Typ)
TN2404K	240	4 @ V <sub>GS</sub> = 10 V	0.8 to 2.0	0.2	4.87
TN2404KL/BS107KL		4 @ V <sub>GS</sub> = 10 V	0.8 to 2.0	0.3	

### FEATURES

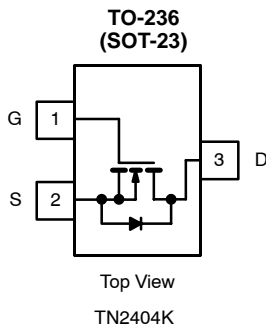
- Low On-Resistance: 4 Ω
- Secondary Breakdown Free: 260 V
- Low Power/Voltage Driven
- Low Input and Output Leakage
- Excellent Thermal Stability

### BENEFITS

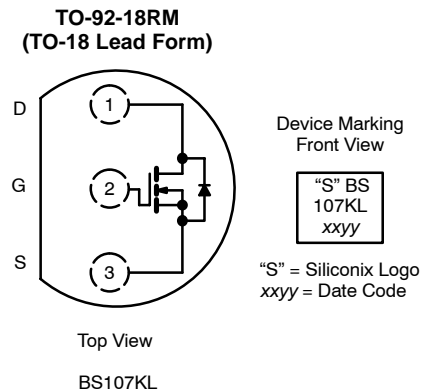
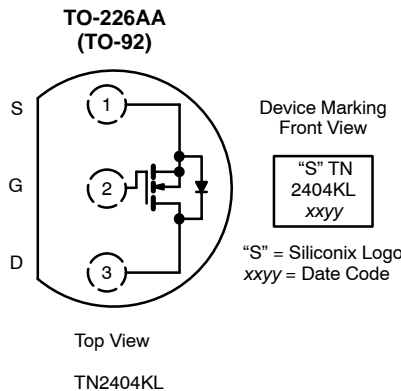
- Low Offset Voltage
- Full-Voltage Operation
- Easily Driven Without Buffer
- Low Error Voltage
- No High-Temperature "Run-Away"

### APPLICATIONS

- High-Voltage Drivers: Relays, Solenoids, Lamps, Hammers, Displays, Transistors, etc.
- Telephone Mute Switches, Ringer Circuits
- Power Supply, Converters
- Motor Control



Marking Code: K1ywI  
 K1 = Part Number Code for TN2404K  
 y = Year Code  
 w = Week Code  
 I = Lot Traceability



### ORDERING INFORMATION

Standard Part Number	Lead (Pb)-Free Part Number	Option
TN2404K-T1	TN2404K-T1—E3	With Tape and Reel Folding Option
TN2404KL-TR1	TN2404KL-TR1—E3	Spool Option
BS107KL-TR1	BS107KL-TR1—E3	

### ABSOLUTE MAXIMUM RATINGS (T<sub>A</sub> = 25 °C UNLESS OTHERWISE NOTED)

Parameter	Symbol	TN2404K	TN2404KL/BS107KL	Unit
Drain-Source Voltage	V <sub>DS</sub>	240		V
Gate-Source Voltage	V <sub>GS</sub>	± 20		
Continuous Drain Current (T <sub>J</sub> = 150 °C)	I <sub>D</sub>	T <sub>A</sub> = 25 °C	0.2	A
		T <sub>A</sub> = 70 °C	0.16	
Pulsed Drain Current <sup>a</sup>	I <sub>DM</sub>	0.8	1.4	
Power Dissipation	P <sub>D</sub>	T <sub>A</sub> = 25 °C	0.36	W
		T <sub>A</sub> = 70 °C	0.23	
Thermal Resistance, Junction-to-Ambient	R <sub>thJA</sub>	350 <sup>b</sup>	156	°C/W
Operating Junction and Storage Temperature Range	T <sub>J</sub> , T <sub>stg</sub>	-55 to 150		°C

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



SPECIFICATIONS (T <sub>A</sub> = 25 °C UNLESS OTHERWISE NOTED)						
Parameter	Symbol	Test Conditions	Limits			Unit
			Min	Typ <sup>a</sup>	Max	
<b>Static</b>						
Drain-Source Breakdown Voltage	V <sub>(BR)DSS</sub>	V <sub>GS</sub> = 0 V, I <sub>D</sub> = 100 μA	240	257		V
Gate-Threshold Voltage	V <sub>GS(th)</sub>	V <sub>DS</sub> = V <sub>GS</sub> , I <sub>D</sub> = 250 μA	0.8	1.65	2.0	
Gate-Body Leakage	I <sub>GSS</sub>	V <sub>DS</sub> = 0 V, V <sub>GS</sub> = ± 20 V			± 100	nA
Zero Gate Voltage Drain Current	I <sub>DSS</sub>	V <sub>DS</sub> = 192 V, V <sub>GS</sub> = 0 V T <sub>J</sub> = 55 °C			1	μA
					10	
On-State Drain Current <sup>b</sup>	I <sub>D(on)</sub>	V <sub>DS</sub> = 10 V, V <sub>GS</sub> = 10 V	0.8			A
		V <sub>DS</sub> = 10 V, V <sub>GS</sub> = 4.5 V	0.5			
Drain-Source On-Resistance <sup>b</sup>	r <sub>DS(on)</sub>	V <sub>GS</sub> = 10 V, I <sub>D</sub> = 0.3 A		2.2	4	Ω
		V <sub>GS</sub> = 4.5 V, I <sub>D</sub> = 0.2 A		2.3	4	
		V <sub>GS</sub> = 2.5 V, I <sub>D</sub> = 0.1 A		2.4	6	
Forward Transconductance <sup>b</sup>	g <sub>fs</sub>	V <sub>DS</sub> = 10 V, I <sub>D</sub> = 0.3 A		1.6		S
Diode Forward Voltage	V <sub>SD</sub>	I <sub>S</sub> = 0.3 A, V <sub>GS</sub> = 0 V		0.8	1.2	V
<b>Dynamic<sup>a</sup></b>						
Total Gate Charge	Q <sub>g</sub>	V <sub>DS</sub> = 192 V, V <sub>GS</sub> = 10 V, I <sub>D</sub> = 0.5 A		4.87	8	nC
Gate-Source Charge	Q <sub>gs</sub>			0.56		
Gate-Drain Charge	Q <sub>gd</sub>			1.53		
Turn-On Time	t <sub>d(on)</sub>	V <sub>DD</sub> = 60 V, R <sub>L</sub> = 200 Ω I <sub>D</sub> = 0.3 A, V <sub>GEN</sub> = 10 V, R <sub>G</sub> = 25 Ω		5	10	nS
	t <sub>r</sub>			12	20	
Turn-Off Time	t <sub>d(off)</sub>			35	60	
	t <sub>r</sub>			16	25	

Notes

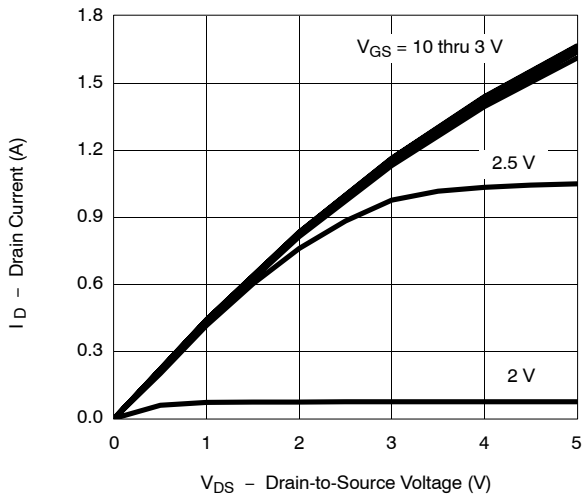
- a. For DESIGN AID ONLY, not subject to production testing.
- b. Pulse test: PW ≤ 300 μs duty cycle ≤ 2%.

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.

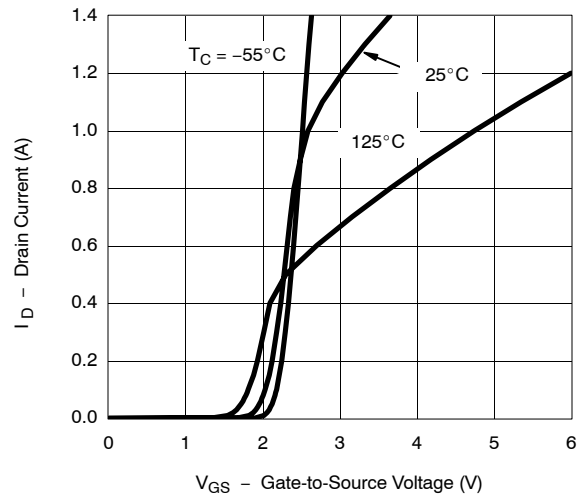


**TYPICAL CHARACTERISTICS (25°C UNLESS NOTED)**

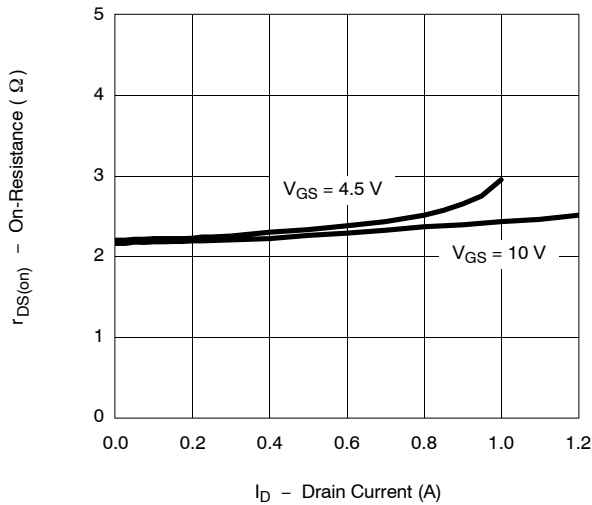
**Output Characteristics**



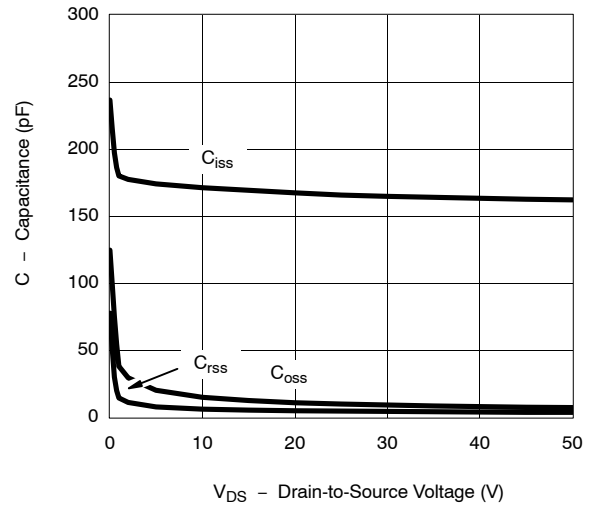
**Transfer Characteristics**



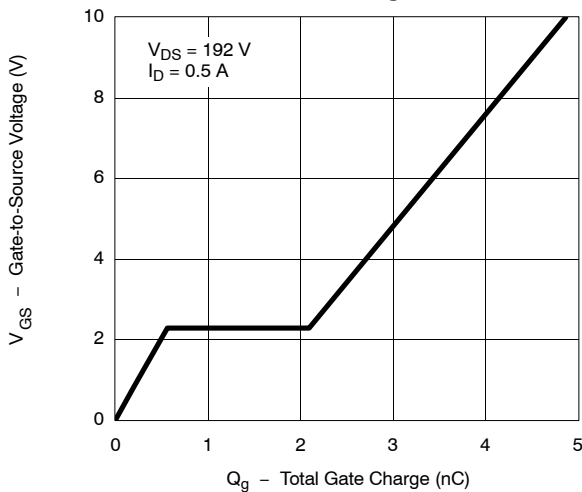
**On-Resistance vs. Drain Current**



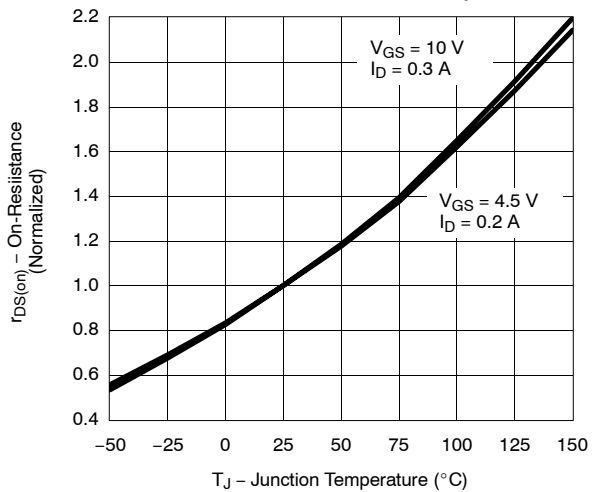
**Capacitance**



**Gate Charge**

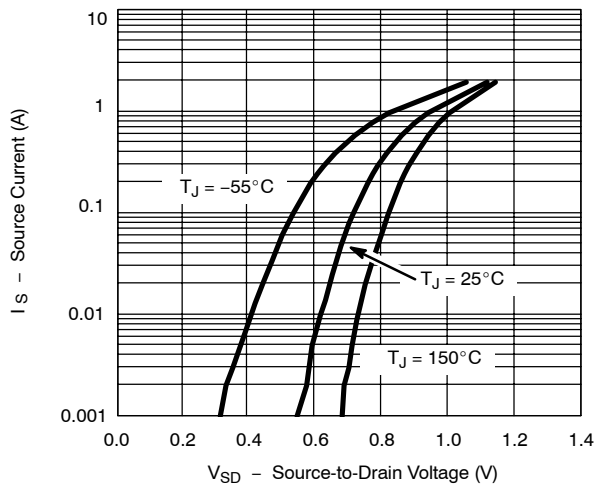


**On-Resistance vs. Junction Temperature**

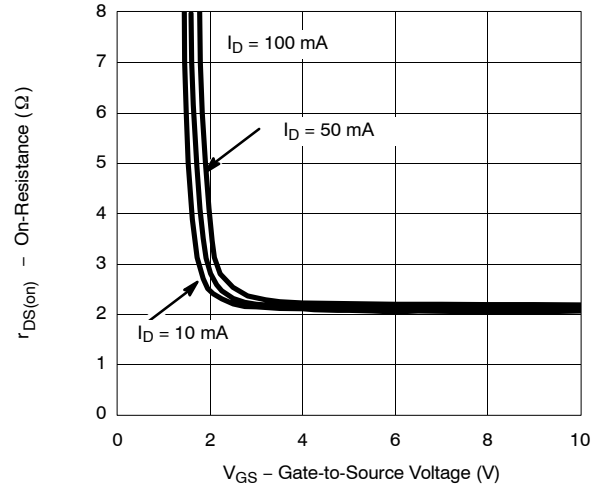


### TYPICAL CHARACTERISTICS (25°C UNLESS NOTED)

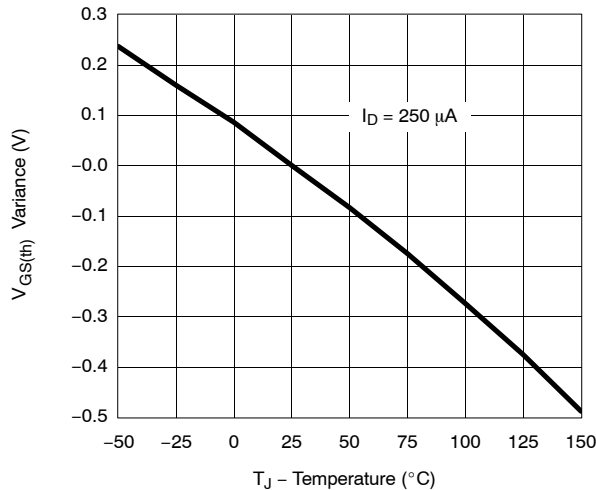
Source-Drain Diode Forward Voltage



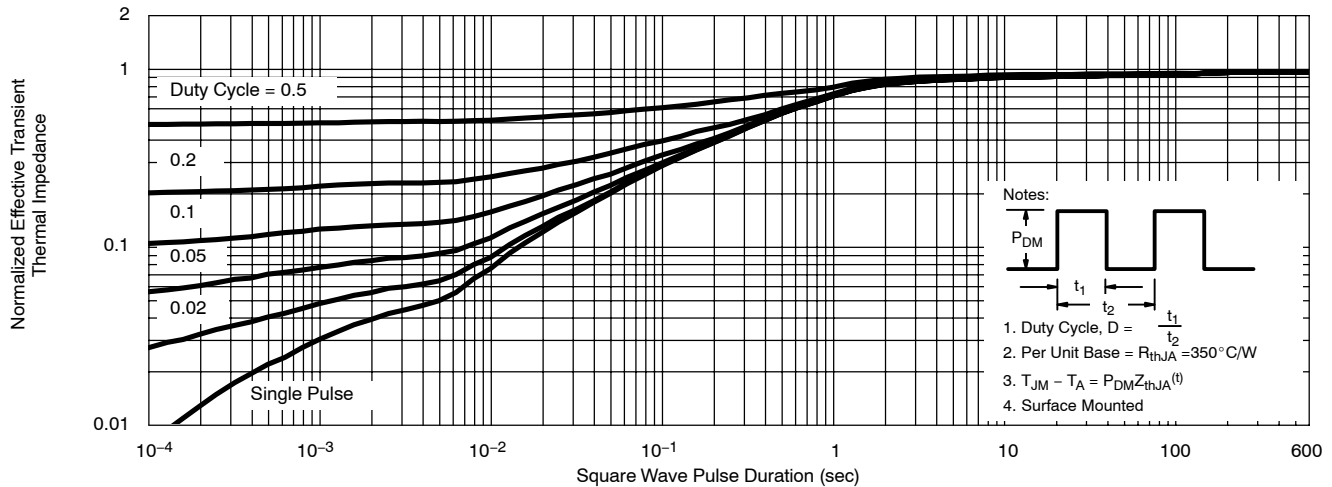
On-Resistance vs. Gate-to-Source Voltage



Threshold Voltage



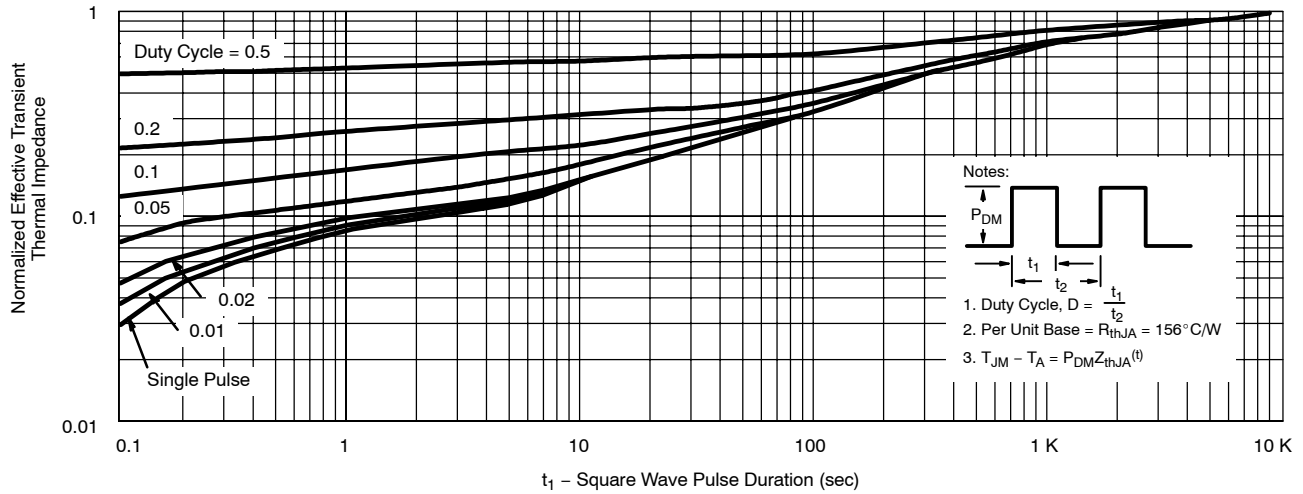
Normalized Thermal Transient Impedance, Junction-to-Ambient (TO-236, TN2404K Only)





**TYPICAL CHARACTERISTICS (25°C UNLESS NOTED)**

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



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