

# NTMFS4707N

## Power MOSFET

30 V, 17 A, Single N-Channel,  
SO-8 Flat Lead

### Features

- Fast Switching Times
- Low Gate Charge
- Low  $R_{DS(on)}$
- Low Inductance SO-8 Package

### Applications

- Notebooks, Graphics Cards
- DC-DC Converters
- Synchronous Rectification

### MAXIMUM RATINGS ( $T_J = 25^\circ\text{C}$ unless otherwise stated)

Parameter		Symbol	Value	Unit	
Drain-to-Source Voltage		$V_{DS}$	30	V	
Gate-to-Source Voltage		$V_{GS}$	$\pm 20$	V	
Continuous Drain Current (Note 1)	Steady State	$I_D$	$T_A = 25^\circ\text{C}$	10.2	A
			$T_A = 85^\circ\text{C}$	7.4	
	$t \leq 10$ s	$T_A = 25^\circ\text{C}$	17		
Power Dissipation (Note 1)	Steady State	$P_D$	$T_A = 25^\circ\text{C}$	2.3	W
	$t \leq 10$ s		6.25		
Continuous Drain Current (Note 2)	Steady State	$I_D$	$T_A = 25^\circ\text{C}$	6.9	A
			$T_A = 85^\circ\text{C}$	4.9	
			$T_A = 25^\circ\text{C}$	1.0	
Power Dissipation (Note 2)	$T_A = 25^\circ\text{C}$	$P_D$	1.0		
Pulsed Drain Current	$t_p \leq 10$ $\mu\text{s}$	$I_{DM}$	51	A	
Operating Junction and Storage Temperature		$T_J, T_{STG}$	-55 to 150	$^\circ\text{C}$	
Source Current (Body Diode)		$I_S$	6.25	A	
Single Pulse Drain-to-Source Avalanche Energy ( $V_{DD} = 25$ V, $V_{GS} = 10$ V, $I_{PK} = 7.0$ A, $L = 10$ mH, $R_G = 25$ $\Omega$ )		$E_{AS}$	245	mJ	
Lead Temperature for Soldering Purposes (1/8" from case for 10 s)		$T_L$	260	$^\circ\text{C}$	

### THERMAL RESISTANCE MAXIMUM RATINGS

Parameter	Symbol	Value	Unit
Junction-to-Ambient - Steady State (Note 1)	$R_{\theta JA}$	55	$^\circ\text{C/W}$
Junction-to-Ambient - $t \leq 10$ s (Note 1)	$R_{\theta JA}$	20	
Junction-to-Ambient - Steady State (Note 2)	$R_{\theta JA}$	122.5	

Maximum ratings are those values beyond which device damage can occur. Maximum ratings applied to the device are individual stress limit values (not normal operating conditions) and are not valid simultaneously. If these limits are exceeded, device functional operation is not implied, damage may occur and reliability may be affected.

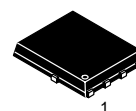
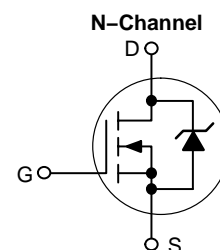
1. Surface-mounted on FR4 board using 1 in sq pad size (Cu area = 1.127 in sq [1 oz] including traces).
2. Surface-mounted on FR4 board using the minimum recommended pad size (Cu area = 0.412 in sq).



**ON Semiconductor**

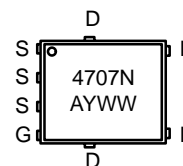
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$V_{(BR)DSS}$	$R_{DS(on)}$ TYP	$I_D$ MAX
30 V	10 m $\Omega$ @ 10 V	17 A
	13.5 m $\Omega$ @ 4.5 V	



SO-8 FLAT LEAD  
CASE 488AA  
STYLE 1

### MARKING DIAGRAM



4707N = Specific Device Code  
A = Assembly Location  
Y = Year  
WW = Work Week

### ORDERING INFORMATION

Device	Package	Shipping <sup>†</sup>
NTMFS4707NT1G	SO-8 FL (Pb-Free)	1500 Tape & Reel
NTMFS4707NT3G	SO-8 FL (Pb-Free)	5000 Tape & Reel

<sup>†</sup>For information on tape and reel specifications, including part orientation and tape sizes, please refer to our Tape and Reel Packaging Specifications Brochure, BRD8011/D.

# NTMFS4707N

## ELECTRICAL CHARACTERISTICS (T<sub>J</sub> = 25°C unless otherwise specified)

Parameter	Symbol	Test Condition	Min	Typ	Max	Unit
<b>OFF CHARACTERISTICS</b>						
Drain-to-Source Breakdown Voltage	V <sub>(BR)DSS</sub>	V <sub>GS</sub> = 0 V, I <sub>D</sub> = 250 μA	30			V
Drain-to-Source Breakdown Voltage Temperature Coefficient	V <sub>(BR)DSS</sub> /T <sub>J</sub>			6.5		mV/°C
Zero Gate Voltage Drain Current	I <sub>DSS</sub>	V <sub>GS</sub> = 0 V, V <sub>DS</sub> = 24 V	T <sub>J</sub> = 25°C		1.0	μA
			T <sub>J</sub> = 125°C		50	
Gate-to-Source Leakage Current	I <sub>GSS</sub>	V <sub>DS</sub> = 0 V, V <sub>GS</sub> = ±20V			±100	nA

## ON CHARACTERISTICS (Note 3)

Gate Threshold Voltage	V <sub>GS(TH)</sub>	V <sub>GS</sub> = V <sub>DS</sub> , I <sub>D</sub> = 250 μA	1.0		2.5	V
Negative Threshold Temperature Coefficient	V <sub>GS(TH)</sub> /T <sub>J</sub>			5.0		mV/°C
Drain-to-Source On Resistance	R <sub>DS(on)</sub>	V <sub>GS</sub> = 10 V, I <sub>D</sub> = 10 A		10	13	mΩ
		V <sub>GS</sub> = 4.5 V, I <sub>D</sub> = 8.0 A		13.5	17	
Forward Transconductance	g <sub>FS</sub>	V <sub>DS</sub> = 15 V, I <sub>D</sub> = 10 A		20		S

## CHARGES, CAPACITANCES AND GATE RESISTANCE

Input Capacitance	C <sub>ISS</sub>	V <sub>GS</sub> = 0 V, f = 1.0 MHz, V <sub>DS</sub> = 24 V		735		pF
Output Capacitance	C <sub>OSS</sub>			295		
Reverse Transfer Capacitance	C <sub>RSS</sub>			80		
Total Gate Charge	Q <sub>G(TOT)</sub>	V <sub>GS</sub> = 4.5 V, V <sub>DS</sub> = 15 V; I <sub>D</sub> = 10 A		7.5	15	nC
Threshold Gate Charge	Q <sub>G(TH)</sub>			1.1		
Gate-to-Source Charge	Q <sub>GS</sub>			2.0		
Gate-to-Drain Charge	Q <sub>GD</sub>			3.6		
Gate Resistance	R <sub>G</sub>			2.4		

## SWITCHING CHARACTERISTICS (Note 4)

Turn-On Delay Time	t <sub>d(on)</sub>	V <sub>GS</sub> = 10 V, V <sub>DD</sub> = 15 V, I <sub>D</sub> = 1.0 A, R <sub>G</sub> = 3.0 Ω		6.0		ns
Rise Time	t <sub>r</sub>			5.0		
Turn-Off Delay Time	t <sub>d(off)</sub>			19		
Fall Time	t <sub>f</sub>			11		

## DRAIN-SOURCE DIODE CHARACTERISTICS

Forward Diode Voltage	V <sub>SD</sub>	V <sub>GS</sub> = 0 V, I <sub>S</sub> = 6.25 A	T <sub>J</sub> = 25°C		0.79	1.0	V
			T <sub>J</sub> = 125°C		0.59		
Reverse Recovery Time	t <sub>RR</sub>	V <sub>GS</sub> = 0 V, dI <sub>S</sub> /dt = 100 A/μs, I <sub>S</sub> = 6.25 A		26		ns	
Charge Time	t <sub>a</sub>			14			
Discharge Time	t <sub>b</sub>			12			
Reverse Recovery Charge	Q <sub>RR</sub>			19			nC

3. Pulse Test: pulse width ≤ 300 μs, duty cycle ≤ 2%.

4. Switching characteristics are independent of operating junction temperatures.

TYPICAL CHARACTERIZATIONS

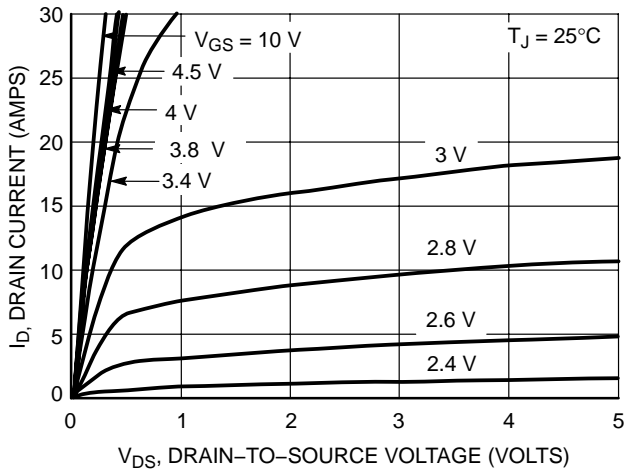


Figure 1. On-Region Characteristics

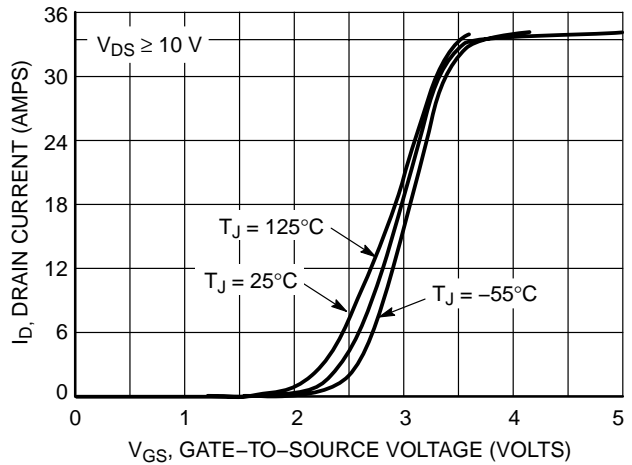


Figure 2. Transfer Characteristics

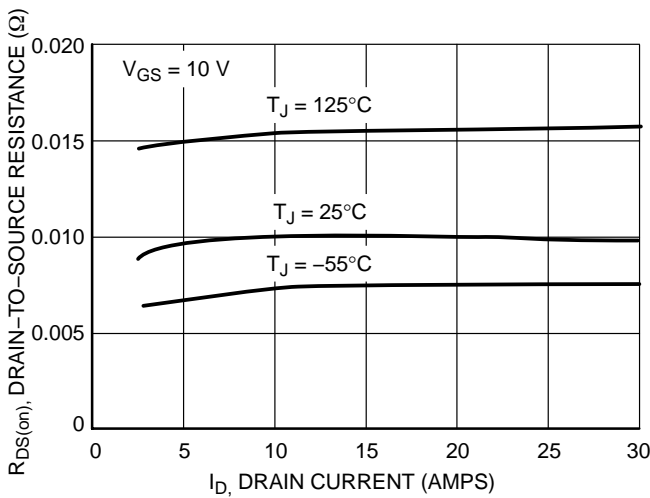


Figure 3. On-Resistance vs. Drain Current and Temperature

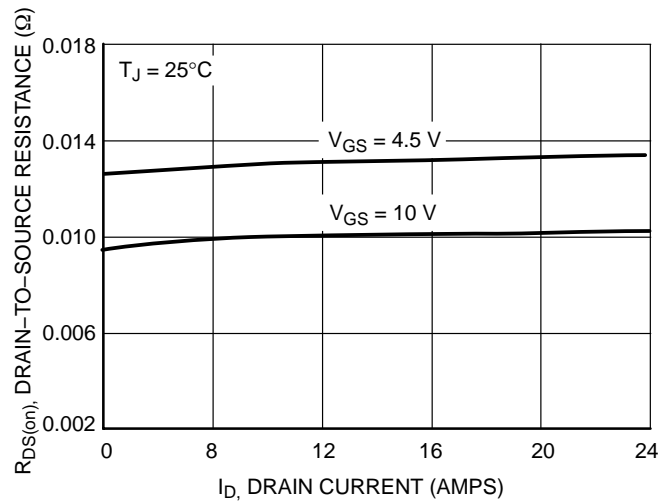


Figure 4. On-Resistance vs. Drain Current and Gate Voltage

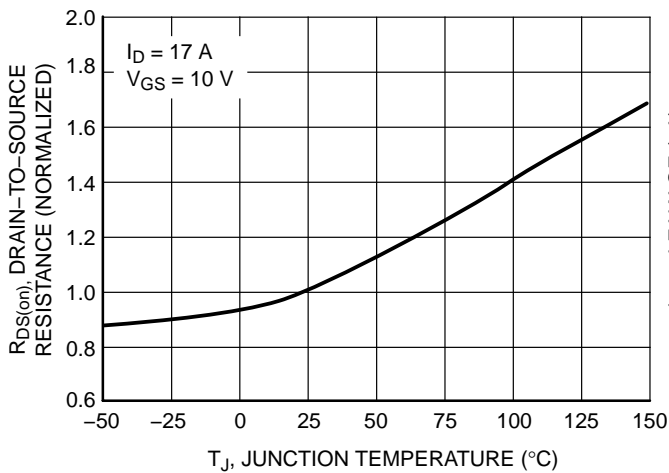


Figure 5. On-Resistance Variation with Temperature

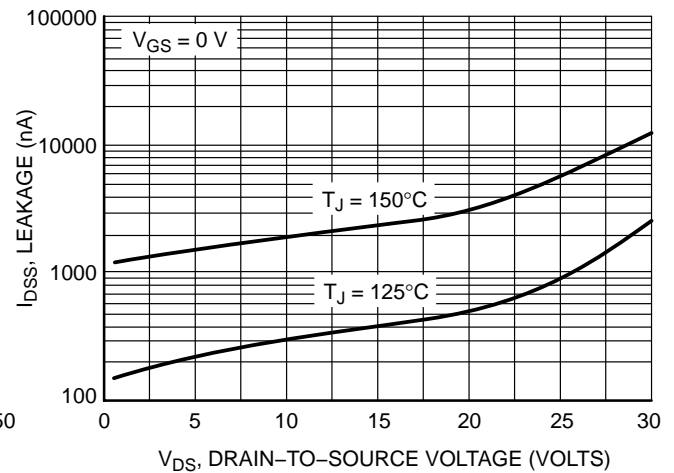
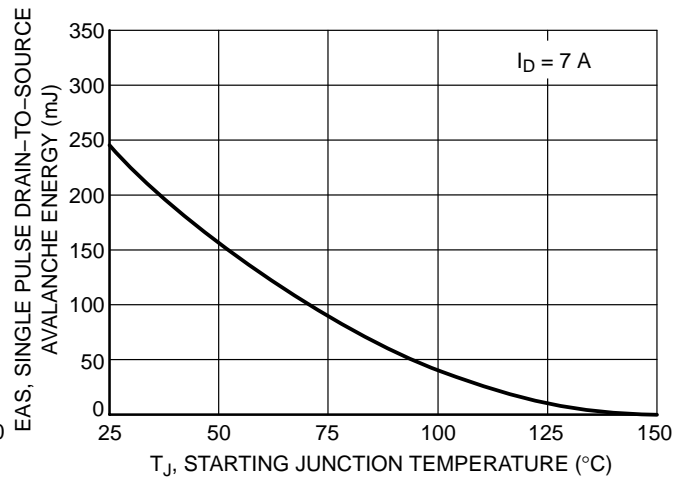
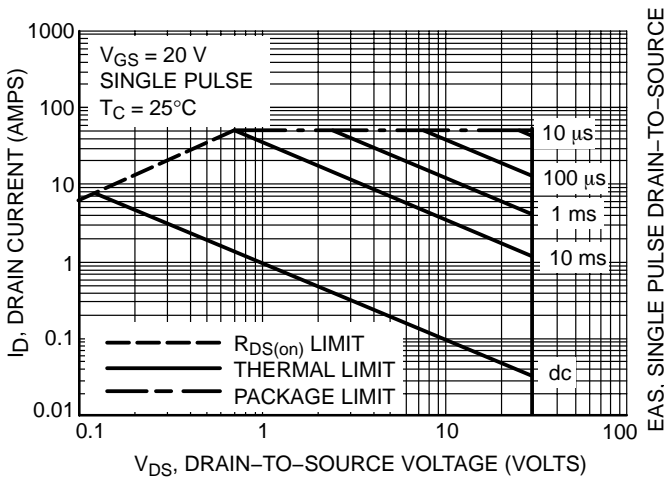
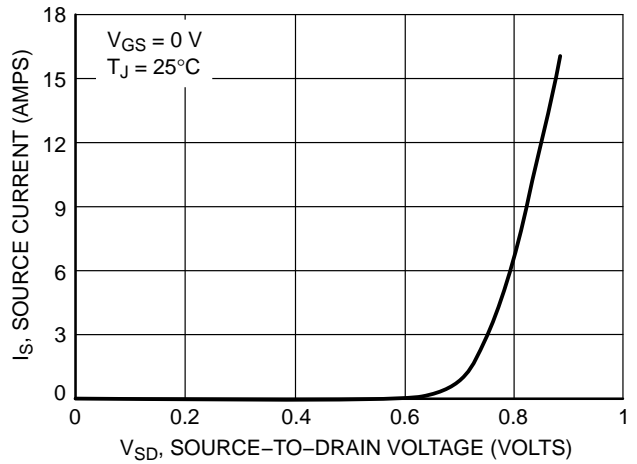
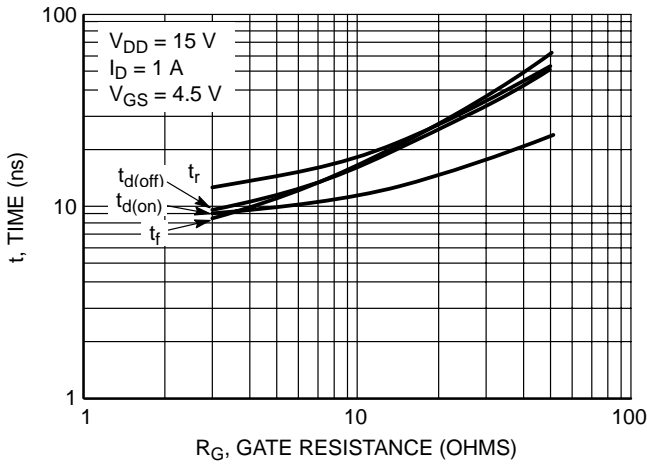
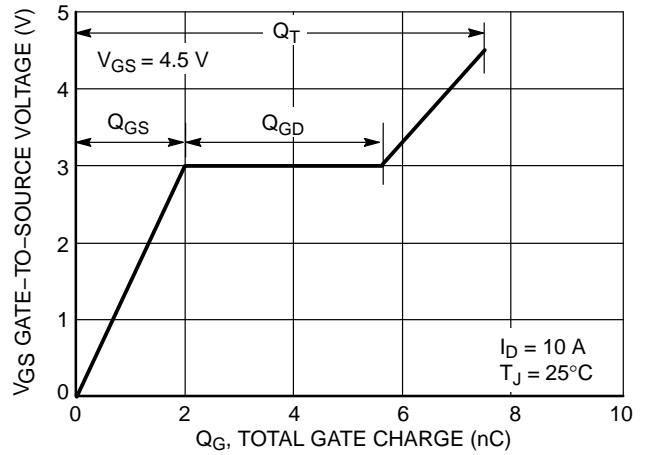
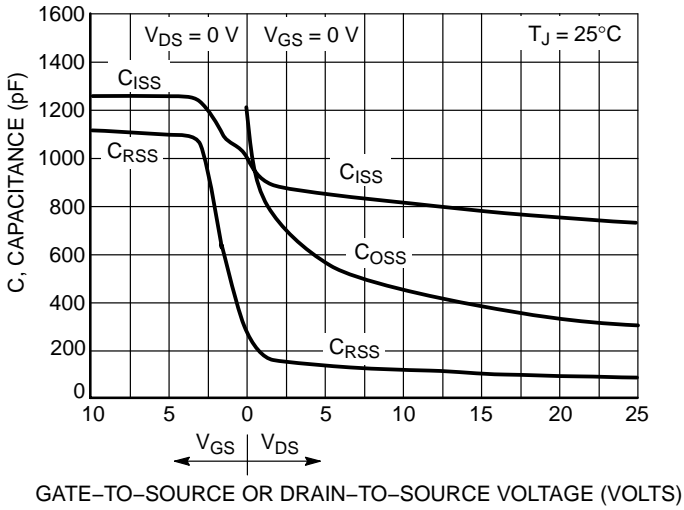


Figure 6. Drain-to-Source Leakage Current vs. Voltage

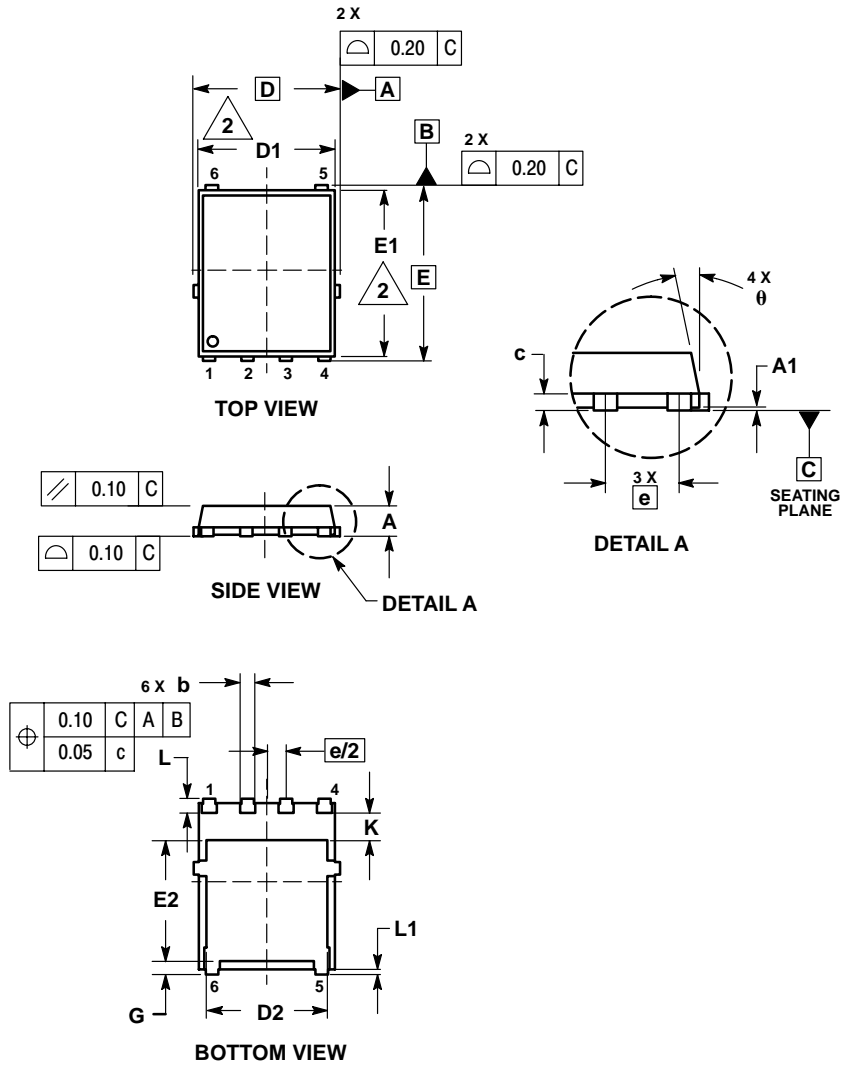
TYPICAL CHARACTERIZATIONS



# NTMFS4707N

## PACKAGE DIMENSIONS

SO-8 FLAT LEAD  
CASE 488AA-01  
ISSUE A




**NOTES:**

1. DIMENSIONING AND TOLERANCING PER ASME Y14.5M, 1994.
2. CONTROLLING DIMENSION: MILLIMETER.
3. DIMENSION D1 AND E1 DO NOT INCLUDE MOLD FLASH PROTRUSIONS OR GATE BURRS.

DIM	MILLIMETERS		
	MIN	NOM	MAX
A	0.90	0.99	1.20
A1	0.00	----	0.05
b	0.33	0.41	0.51
c	0.23	0.28	0.33
D	5.15 BSC		
D1	4.50	4.90	5.10
D2	3.50	----	4.22
E	6.15 BSC		
E1	5.50	5.80	6.10
E2	3.45	----	4.30
e	1.27 BSC		
G	0.51	0.61	0.71
K	0.51	----	----
L	0.51	0.61	0.71
L1	0.05	0.17	0.20
θ	0°	----	12°

**STYLE 1:**

- PIN 1. SOURCE
- SOURCE
- SOURCE
- GATE
- DRAIN
- DRAIN

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