

NTJD4105C

Small Signal MOSFET

20 V / -8.0 V, Complementary,
+0.63 A / -0.775 A, SC-88

Features

- Complementary N and P Channel Device
- Leading -8.0 V Trench for Low $R_{DS(on)}$ Performance
- ESD Protected Gate – ESD Rating: Class 1
- SC-88 Package for Small Footprint (2 x 2 mm)
- Pb-Free Package May be Available. The G-Suffix Denotes a Pb-Free Lead Finish

Applications

- DC-DC Conversion
- Load/Power Switching
- Single or Dual Cell Li-Ion Battery Supplied Devices
- Cell Phones, MP3s, Digital Cameras, PDAs

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

Parameter	Symbol	Value	Unit	
Drain-to-Source Voltage	N-Ch	20	V	
	P-Ch	-8.0		
Gate-to-Source Voltage	N-Ch	± 12	V	
	P-Ch	± 8.0		
Continuous Drain Current – Steady State (Based on $R_{\theta JA}$)	N-Ch	$T_A=25^\circ\text{C}$	0.63	A
		$T_A=85^\circ\text{C}$	0.46	
	P-Ch	$T_A=25^\circ\text{C}$	-0.775	
		$T_A=85^\circ\text{C}$	-0.558	
Continuous Drain Current – Steady State (Based on $R_{\theta JL}$)	N-Ch	$T_A=25^\circ\text{C}$	0.91	
		$T_A=85^\circ\text{C}$	0.65	
	P-Ch	$T_A=25^\circ\text{C}$	-1.1	
		$T_A=85^\circ\text{C}$	-0.8	
Pulsed Drain Current	$t_p \leq 10 \mu\text{s}$	I_{DM}	± 1.2	A
Power Dissipation – Steady State (Based on $R_{\theta JA}$)	$T_A=25^\circ\text{C}$	P_D	0.27	W
	$T_A=85^\circ\text{C}$		0.14	
Power Dissipation – Steady State (Based on $R_{\theta JL}$)	$T_A=25^\circ\text{C}$		0.55	
	$T_A=85^\circ\text{C}$		0.29	
Operating Junction and Storage Temperature	T_J, T_{STG}	-55 to 150		$^\circ\text{C}$
Source Current (Body Diode)	N-Ch	I_S	0.63	A
	P-Ch		-0.775	
Lead Temperature for Soldering Purposes (1/8" from case for 10 s)	T_L	260		$^\circ\text{C}$

THERMAL RESISTANCE RATINGS (Note 1)

Junction-to-Ambient – Steady State	Typ	$R_{\theta JA}$	400	$^\circ\text{C/W}$
	Max		460	
Junction-to-Lead (Drain) – Steady State	Typ	$R_{\theta JL}$	194	
	Max		226	

1. Surface mounted on FR4 board using 1 oz Cu area = 0.9523 in sq.

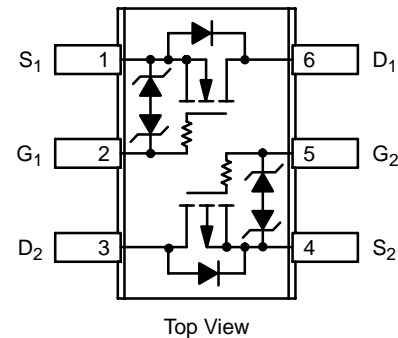


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$V_{(BR)DSS}$	$R_{DS(on)}$ TYP	I_D MAX
N-Ch 20 V	0.29 Ω @ 4.5 V	0.63 A
	0.36 Ω @ 2.5 V	
P-Ch -8.0 V	0.22 Ω @ -4.5 V	-0.775 A
	0.32 Ω @ -2.5 V	
	0.51 Ω @ -1.8 V	

SOT-363 SC-88 (6-LEADS)

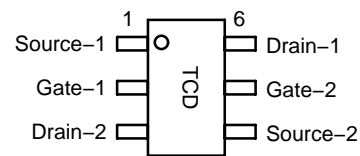


Top View



SC-88 (SOT-363) CASE 419B Style 26

MARKING DIAGRAM & PIN ASSIGNMENT



Top View

TC = Specific Device Code
D = Date Code

ORDERING INFORMATION

See detailed ordering and shipping information in the package dimensions section on page 7 of this data sheet.

NTJD4105C

ELECTRICAL CHARACTERISTICS (T_J = 25°C unless otherwise noted)

Parameter	Symbol	N/P	Test Condition	Min	Typ	Max	Units
OFF CHARACTERISTICS							
Drain-to-Source Breakdown Voltage	V _{(BR)DSS}	N	V _{GS} =0 V	I _D =250 μA	20	27	V
		P		I _D =-250 μA	-8.0	-10.5	
Drain-to-Source Breakdown Voltage Temperature Coefficient	V _{(BR)DSS} / T _J	N				22	mV/°C
		P					
Zero Gate Voltage Drain Current	I _{DSS}	N	V _{GS} =0 V, V _{DS} =16 V	T _J =25 °C		1.0	μA
		P	V _{GS} =0 V, V _{DS} =-6.4 V			1.0	
Gate-to-Source Leakage Current	I _{GSS}	N	V _{DS} =0 V	V _{GS} =±12 V		10	μA
		P		V _{GS} =±8.0		10	

ON CHARACTERISTICS (Note 2)

Gate Threshold Voltage	V _{GS(TH)}	N	V _{GS} =V _{DS}	I _D =250 μA	0.6	0.92	1.5	V
		P		I _D =-250 μA	-0.45	-0.83	-1.0	
Gate Threshold Temperature Coefficient	V _{GS(TH)} / T _J	N				-2.1		-mV/°C
		P					2.2	
Drain-to-Source On Resistance	R _{DS(on)}	N	V _{GS} =4.5 V, I _D =0.63 A		0.29	0.375	Ω	
		P	V _{GS} =-4.5 V, I _D =-0.57 A		0.22	0.30		
		N	V _{GS} =2.5 V, I _D =0.40 A		0.36	0.445		
		P	V _{GS} =-2.5 V, I _D =-0.48 A		0.32	0.46		
		P	V _{GS} =-1.8 V, I _D =-0.20 A		0.51	0.90		
Forward Transconductance	g _{FS}	N	V _{DS} =4.0 V, I _D =0.63 A		2.0		S	
		P	V _{DS} =-4.0 V, I _D =-0.57 A		2.0			

CHARGES AND CAPACITANCES

Input Capacitance	C _{ISS}	N	f=1 MHz, V _{GS} =0 V	V _{DS} =20 V	33	46	pF	
		P		V _{DS} =-8.0V	160	225		
Output Capacitance	C _{OSS}	N		V _{DS} =20 V	13	22		
		P		V _{DS} =-8.0 V	38	55		
Reverse Transfer Capacitance	C _{RSS}	N		V _{DS} =20 V	2.8	5.0		
		P		V _{DS} =-8.0 V	28	40		
Total Gate Charge	Q _{G(TOT)}	N		V _{GS} =4.5 V, V _{DS} =10 V, I _D =0.7 A	1.3	3.0		nC
		P		V _{GS} =-4.5 V, V _{DS} =-5.0 V, I _D =-0.6 A	2.2	4.0		
Threshold Gate Charge	Q _{G(TH)}	N		V _{GS} =4.5 V, V _{DS} =10 V, I _D =0.7 A	0.1			
		P		V _{GS} =-4.5 V, V _{DS} =-5.0 V, I _D =-0.6 A	0.1			
Gate-to-Source Charge	Q _{GS}	N	V _{GS} =4.5 V, V _{DS} =10 V, I _D =0.7 A	0.2				
		P	V _{GS} =-4.5 V, V _{DS} =-5.0 V, I _D =-0.6 A	0.5				
Gate-to-Drain Charge	Q _{GD}	N	V _{GS} =4.5 V, V _{DS} =10 V, I _D =0.7 A	0.4				
		P	V _{GS} =-4.5 V, V _{DS} =-5.0 V, I _D =-0.6 A	0.5				

SWITCHING CHARACTERISTICS (Note 3)

Turn-On Delay Time	t _{d(ON)}	N	V _{GS} =4.5 V, V _{DD} =10 V, I _D =0.5 A, R _G =20 Ω	0.083		μs
Rise Time	t _r			0.227		
Turn-Off Delay Time	t _{d(OFF)}			0.786		
Fall Time	t _f			0.506		
Turn-On Delay Time	t _{d(ON)}	P	V _{GS} =-4.5 V, V _{DD} =-4.0 V, I _D =-0.5 A, R _G =8.0 Ω	0.013		
Rise Time	t _r			0.023		
Turn-Off Delay Time	t _{d(OFF)}			0.050		
Fall Time	t _f			0.036		

DRAIN-SOURCE DIODE CHARACTERISTICS

Forward Diode Voltage	V _{SD}	N	V _{GS} =0 V, T _J =25°C	I _S =0.23 A	0.76	1.1	V
		P		I _S =-0.23 A	0.76	1.1	
		N	V _{GS} =0 V, T _J =125°C	I _S =0.23 A	0.63		
		P		I _S =-0.23 A	0.63		
Reverse Recovery Time	t _{RR}	N	V _{GS} =0 V, d _I /d _t =90 A/μs	I _S =0.23 A	0.410		μs
		P		I _S =-0.23 A	0.078		

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

3. Switching characteristics are independent of operating junction temperatures.

NTJD4105C

TYPICAL N-CHANNEL PERFORMANCE CURVES ($T_J = 25^\circ\text{C}$ unless otherwise noted)

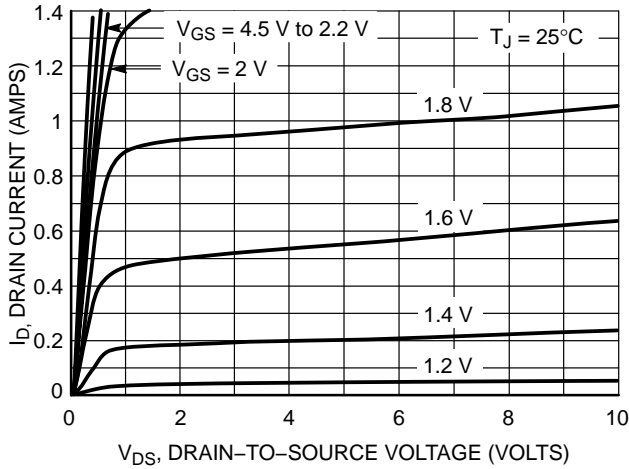


Figure 1. On-Region Characteristics

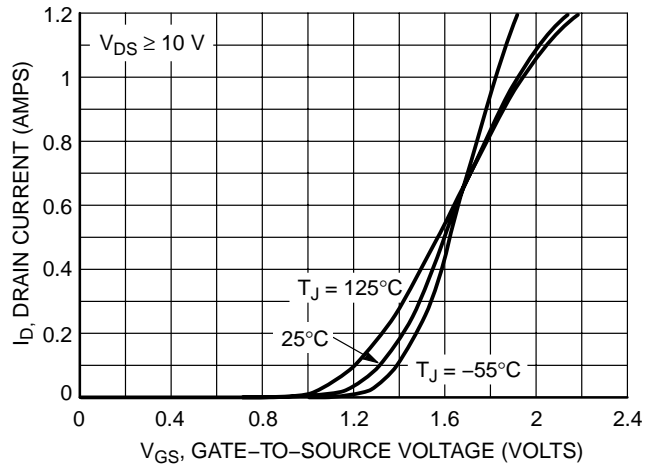


Figure 2. Transfer Characteristics

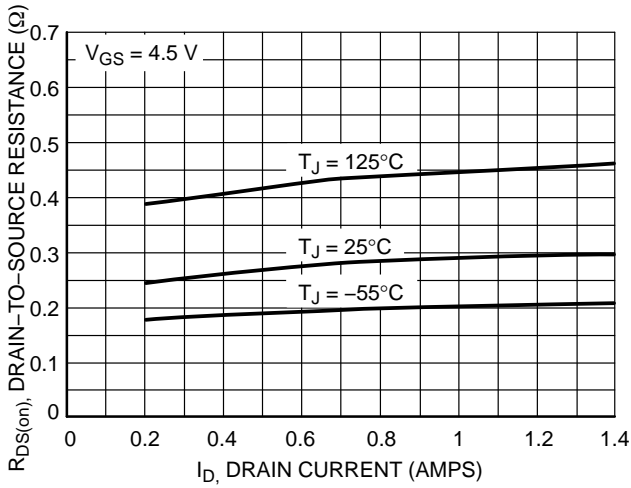


Figure 3. On-Resistance vs. Drain Current and Temperature

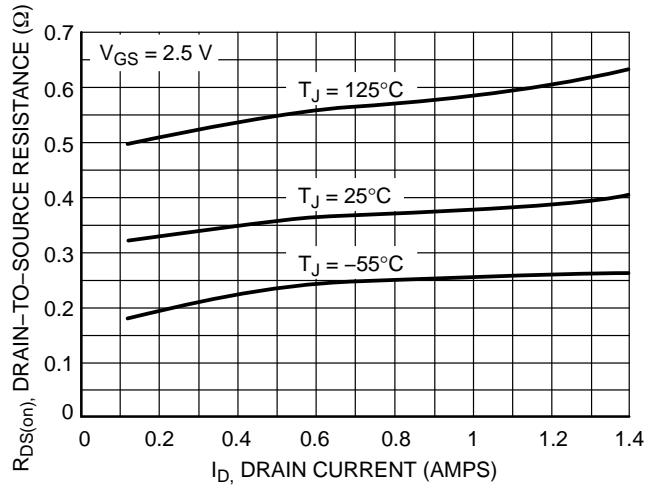


Figure 4. On-Resistance vs. Drain Current and Temperature

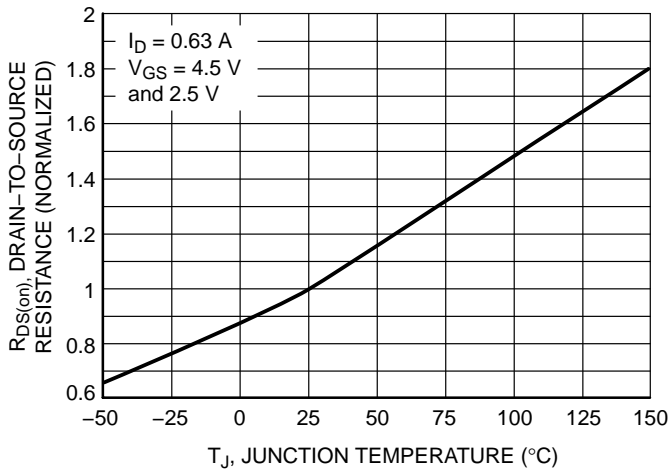


Figure 5. On-Resistance Variation with Temperature

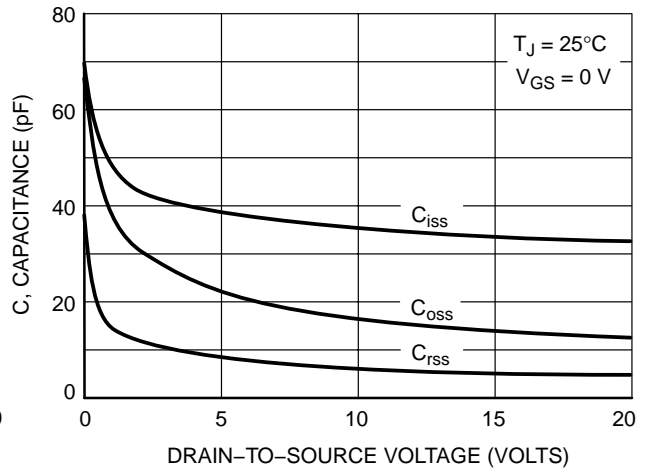


Figure 6. Capacitance Variation

NTJD4105C

TYPICAL N-CHANNEL PERFORMANCE CURVES ($T_J = 25^\circ\text{C}$ unless otherwise noted)

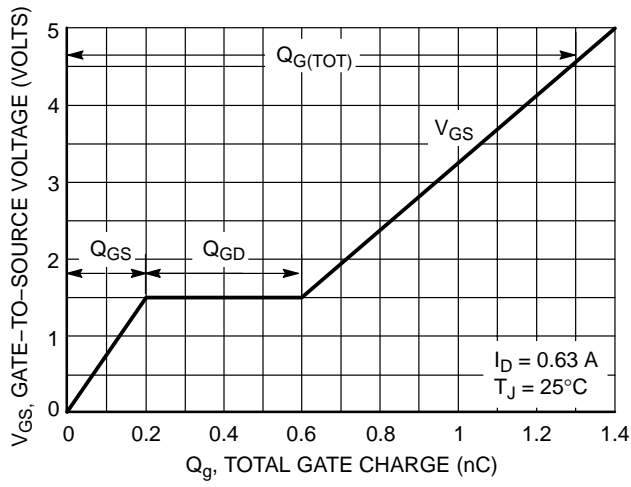


Figure 7. Gate-to-Source and Drain-to-Source Voltage vs. Total Charge

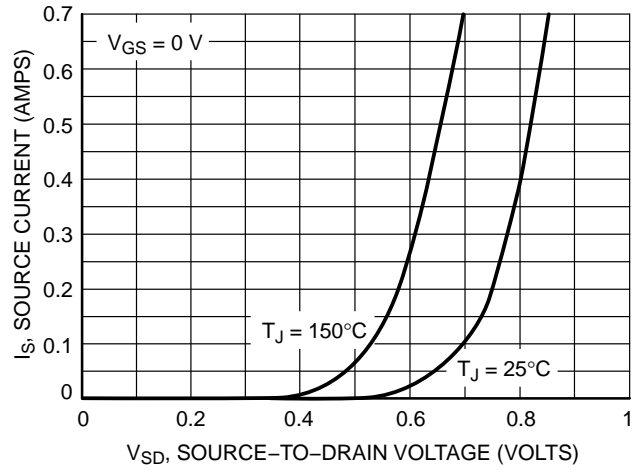


Figure 8. Diode Forward Voltage vs. Current

TYPICAL P-CHANNEL PERFORMANCE CURVES ($T_J = 25^\circ\text{C}$ unless otherwise noted)

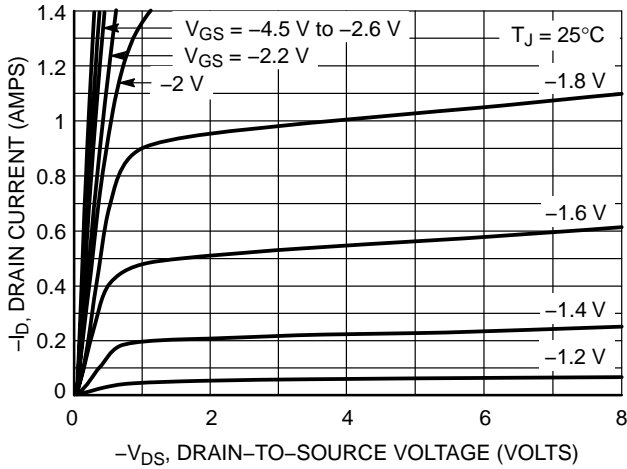


Figure 9. On-Region Characteristics

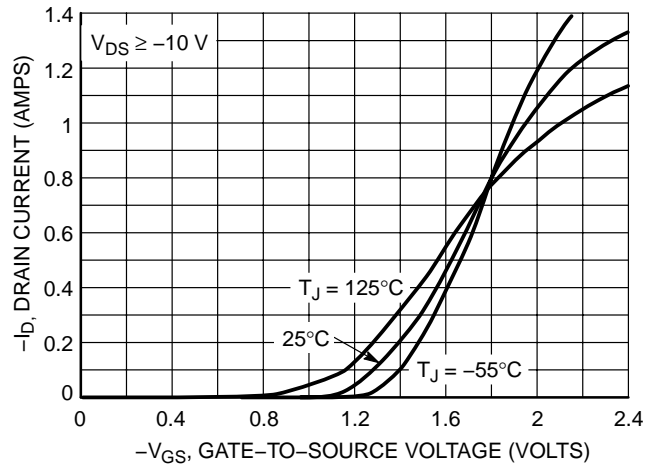


Figure 10. Transfer Characteristics

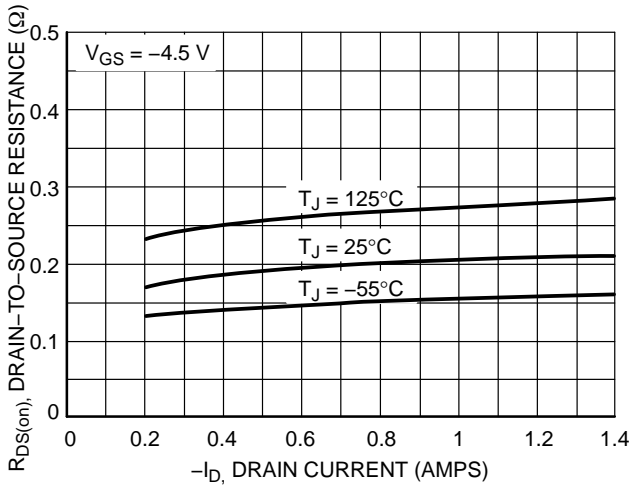


Figure 11. On-Resistance vs. Drain Current and Temperature

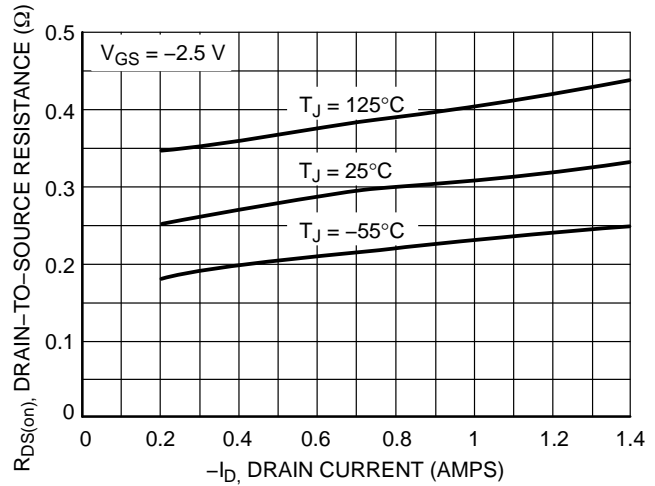


Figure 12. On-Resistance vs. Drain Current and Temperature

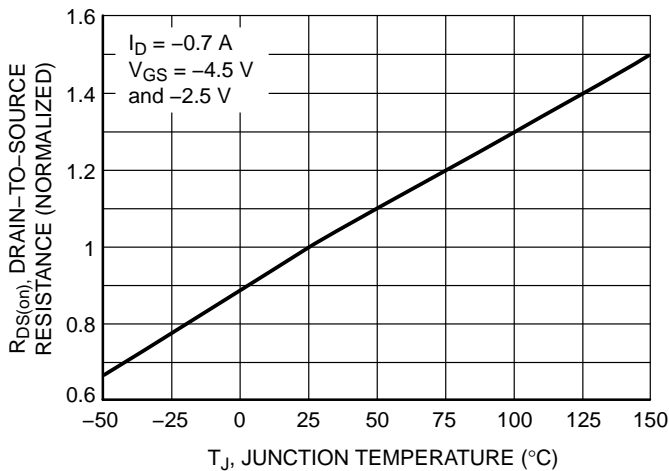


Figure 13. On-Resistance Variation with Temperature

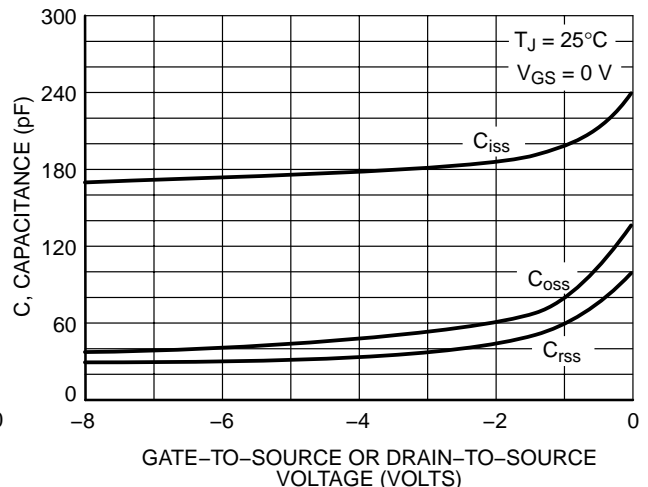


Figure 14. Capacitance Variation

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TYPICAL P-CHANNEL PERFORMANCE CURVES ($T_J = 25^\circ\text{C}$ unless otherwise noted)

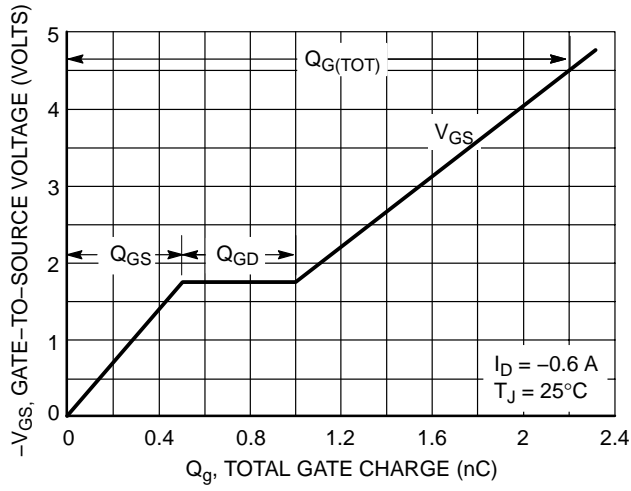


Figure 15. Gate-to-Source and Drain-to-Source Voltage vs. Total Charge

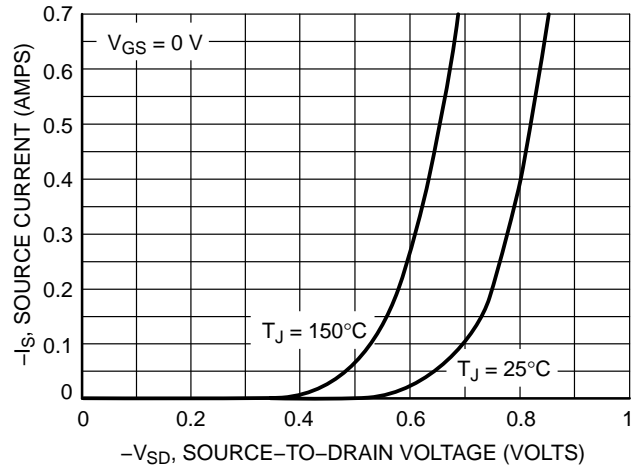


Figure 16. Diode Forward Voltage vs. Current

NTJD4105C

ORDERING INFORMATION1

Device	Package	Shipping†
NTJD4105CT1	SOT-363	3000 / Tape & Reel
NTJD4105CT1G	SOT-363 (Pb-Free)	3000 / Tape & Reel
NTJD4105CT2	SOT-363	3000 / Tape & Reel
NTJD4105CT2G	SOT-363 (Pb-Free)	3000 / Tape & Reel
NTJD4105CT4	SOT-363	10,000 / Tape & Reel
NTJD4105CT4G	SOT-363 (Pb-Free)	10,000 / Tape & Reel

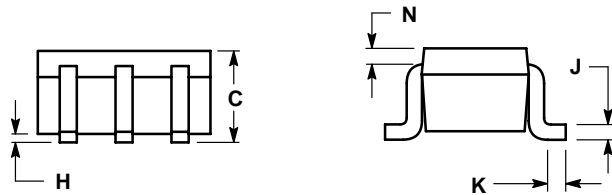
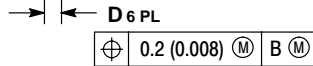
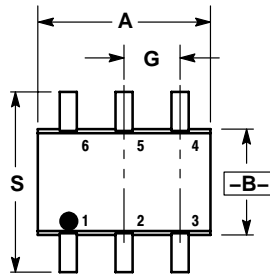
†For information on tape and reel specifications, including part orientation and tape sizes, please refer to our Tape and Reel Packaging Specifications Brochure, BRD8011/D.

NTJD4105C

PACKAGE DIMENSIONS

SC-88 (SOT-363) CASE 419B-02 ISSUE T

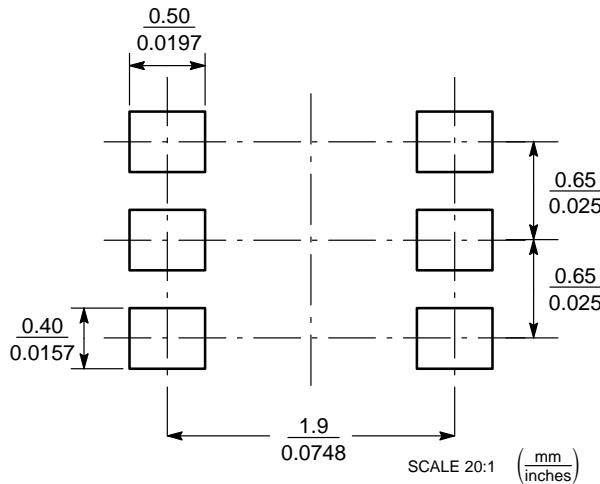
- NOTES:
1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
 2. CONTROLLING DIMENSION: INCH.
 3. 419B-01 OBSOLETE, NEW STANDARD 419B-02.



DIM	INCHES		MILLIMETERS	
	MIN	MAX	MIN	MAX
A	0.071	0.087	1.80	2.20
B	0.045	0.053	1.15	1.35
C	0.031	0.043	0.80	1.10
D	0.004	0.012	0.10	0.30
G	0.026 BSC		0.65 BSC	
H	---	0.004	---	0.10
J	0.004	0.010	0.10	0.25
K	0.004	0.012	0.10	0.30
N	0.008 REF		0.20 REF	
S	0.079	0.087	2.00	2.20

- STYLE 26:
PIN 1. SOURCE 1
2. GATE 1
3. DRAIN 2
4. SOURCE 2
5. GATE 2
6. DRAIN 1

SOLDERING FOOTPRINT*



SC-88/SC70-6

*For additional information on our Pb-Free strategy and soldering details, please download the ON Semiconductor Soldering and Mounting Techniques Reference Manual, SOLDERRM/D.

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