

MOSFET – Small Signal, Complementary, SC-88 20 V / -8.0 V, +0.63 A / -0.775 A NTJD4105C

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 Packages are Available

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)

Symbol	Parameter			Value	Unit
V _{DSS}	Drain-to-Source Voltage		N-Ch	20	V
			P-Ch	-8.0	
V _{GS}	Gate-to-Source Voltage		N-Ch	±12	V
			P-Ch	±8.0	
I _D	Continuous Drain Current – Steady State (Based on R _{θJA})	N-Ch	T _A = 25°C	0.63	A
			T _A = 85°C	0.46	
		P-Ch	T _A = 25°C	-0.775	
			T _A = 85°C	-0.558	
	Continuous Drain Current – Steady State (Based on R _{θJL})	N-Ch	T _A = 25°C	0.91	
			T _A = 85°C	0.65	
P-Ch		T _A = 25°C	-1.1		
		T _A = 85°C	-0.8		
I _{DM}	Pulsed Drain Current		tp ≤10 μs	±1.2	A
P _D	Power Dissipation – Steady State (Based on R _{θJA})		T _A = 25°C	0.27	W
			T _A = 85°C	0.14	
	Power Dissipation – Steady State (Based on R _{θJL})		T _A = 25°C	0.55	
			T _A = 85°C	0.29	
T _J , T _{STG}	Operating Junction and Storage Temperature			-55 to 150	°C
I _S	Source Current (Body Diode)		N-Ch	0.63	A
			P-Ch	-0.775	
T _L	Lead Temperature for Soldering Purposes (1/8" from case for 10 s)			260	°C

Stresses exceeding those listed in the Maximum Ratings table may damage the device. If any of these limits are exceeded, device functionality should not be assumed, damage may occur and reliability may be affected.

THERMAL RESISTANCE RATINGS (Note 1).

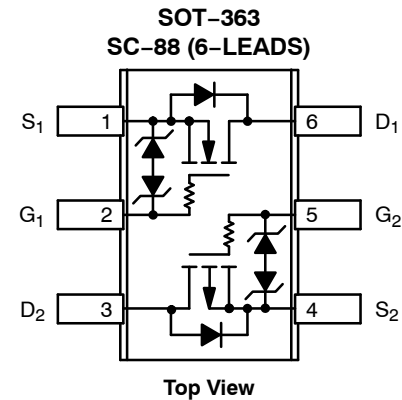
Symbol	Parameter		Value	Unit
$R_{\theta JA}$	Junction-to-Ambient – Steady State	Typ	400	$^\circ\text{C/W}$
		Max	460	
$R_{\theta JL}$	Junction-to-Lead (Drain) – Steady State	Typ	194	$^\circ\text{C/W}$
		Max	226	

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

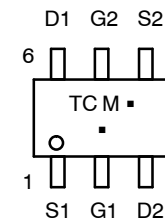
$V_{(BR)DSS}$	$R_{DS(on)}$ TYP	I_D Max
N-Ch 20 V	0.29 Ω @ 4.5 V	0.63 A
	0.36 Ω @ 2.5 V	
P-Ch -8.0 V	0.22 Ω @ -4.5 V	-0.775 A
	0.32 Ω @ -2.5 V	
	0.51 Ω @ -1.8 V	



SC-88/SOT-363
CASE 419B
STYLE 28



MARKING DIAGRAM & PIN ASSIGNMENT



TC = Device Code
M = Date Code
▪ = Pb-Free Package

(Note: Microdot may be in either location)

ORDERING INFORMATION

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

NOTE: Some of the devices on this data sheet have been **DISCONTINUED**. Please refer to the table on page 7.

NTJD4105C

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

Symbol	Parameter	N/P	Test Condition	Min	Typ	Max	Units
OFF CHARACTERISTICS							
V _{(BR)DSS}	Drain-to-Source Breakdown Voltage	N	V _{GS} = 0 V	I _D = 250 μA	20	27	V
		P		I _D = -250 μA	-8.0	-10.5	
V _{(BR)DSS} / T _J	Drain-to-Source Breakdown Voltage Temperature Coefficient	N			22		mV/°C
		P			-6.0		
I _{DSS}	Zero Gate Voltage Drain Current	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	
I _{GSS}	Gate-to-Source Leakage Current	N	V _{DS} = 0 V	V _{GS} = ±12 V		10	μA
		P		V _{GS} = ±8.0		10	

ON CHARACTERISTICS (Note 2)

V _{GS(TH)}	Gate Threshold Voltage	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	
V _{GS(TH)} / T _J	Gate Threshold Temperature Coefficient	N				-2.1		-mV/ °C
		P				2.2		
R _{DS(on)}	Drain-to-Source On Resistance	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	
g _{FS}	Forward Transconductance	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

C _{ISS}	Input Capacitance	N	f = 1 MHz, V _{GS} = 0 V	V _{DS} = 20 V		33	46	pF
		P		V _{DS} = -8.0 V		160	225	
C _{OSS}	Output Capacitance	N		V _{DS} = 20 V		13	22	
		P		V _{DS} = -8.0 V		38	55	
C _{RSS}	Reverse Transfer Capacitance	N		V _{DS} = 20 V		2.8	5.0	nF
		P		V _{DS} = -8.0 V		28	40	
Q _{G(TOT)}	Total Gate Charge	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	
Q _{G(TH)}	Threshold Gate Charge	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		
Q _{GS}	Gate-to-Source Charge	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		
Q _{GD}	Gate-to-Drain Charge	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)

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

DRAIN-SOURCE DIODE CHARACTERISTICS

V _{SD}	Forward Diode Voltage	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		
t _{RR}	Reverse Recovery Time	N	V _{GS} = 0 V, dI _S /dt = 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.

TYPICAL N-CHANNEL PERFORMANCE CURVES ($T_J = 25^\circ\text{C}$ UNLESS OTHERWISE NOTED)

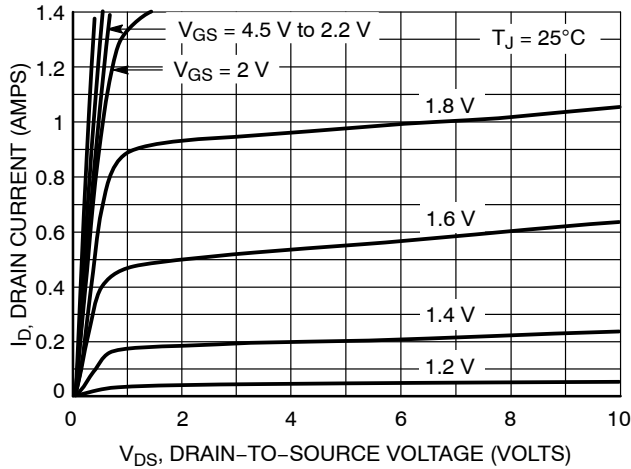


Figure 1. On-Region Characteristics

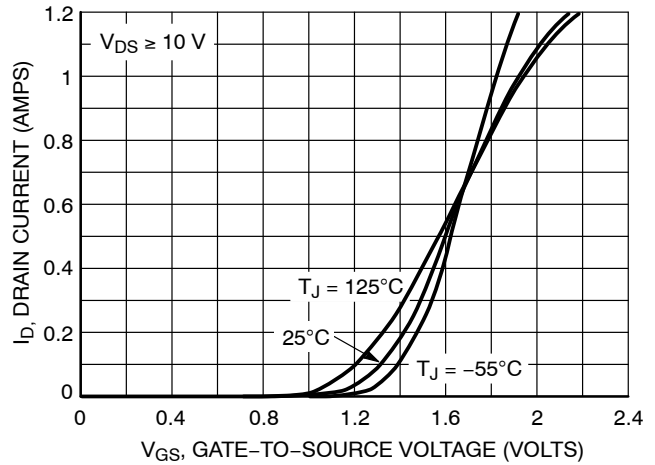


Figure 2. Transfer Characteristics

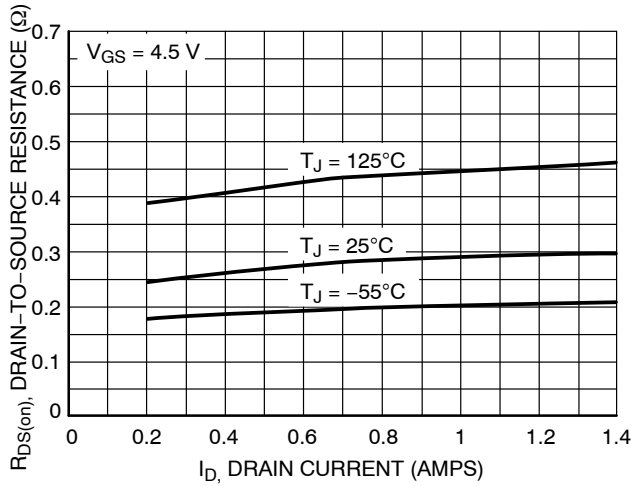


Figure 3. On-Resistance vs. Drain Current and Temperature

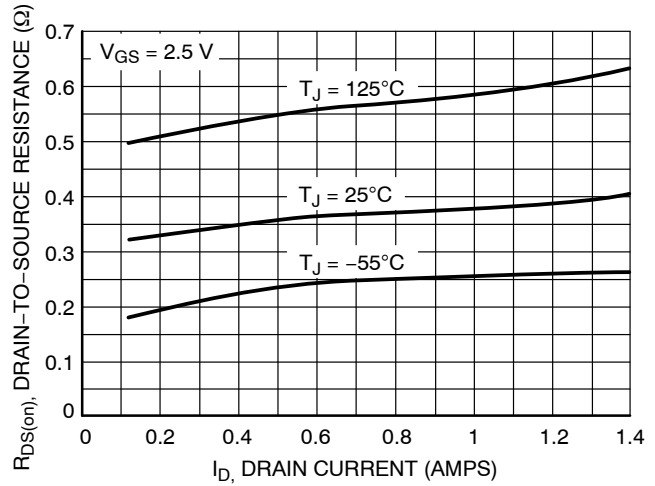


Figure 4. On-Resistance vs. Drain Current and Temperature

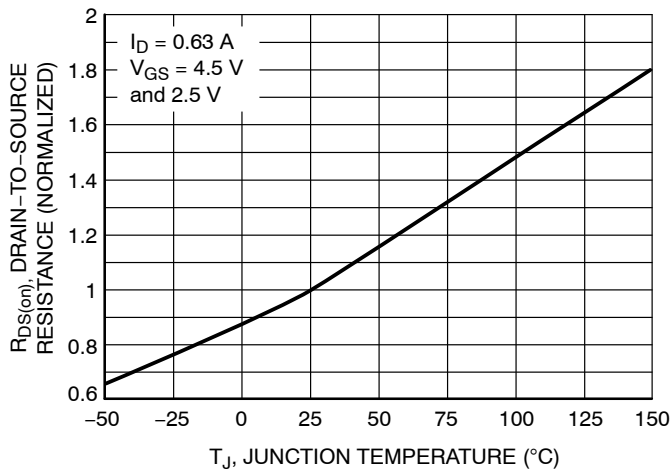


Figure 5. On-Resistance Variation with Temperature

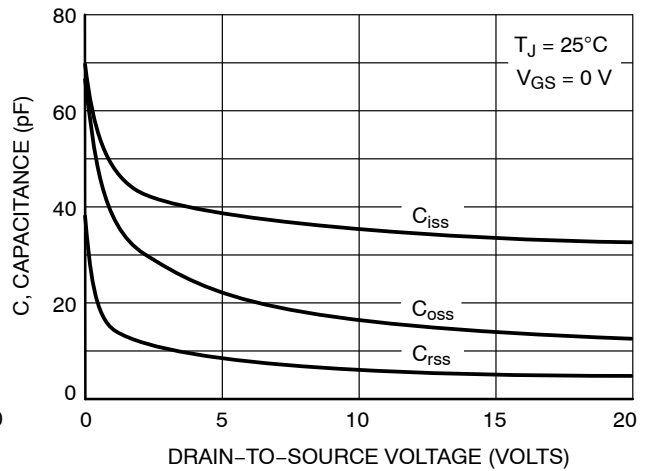


Figure 6. Capacitance Variation

TYPICAL N-CHANNEL PERFORMANCE CURVES ($T_J = 25^\circ\text{C}$ UNLESS OTHERWISE NOTED) (continued)

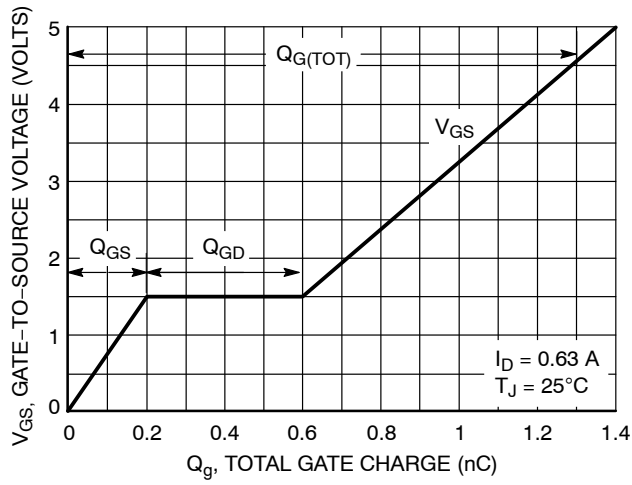


Figure 7. Gate-to-Source and Drain-to-Source Voltage vs. Total Charge

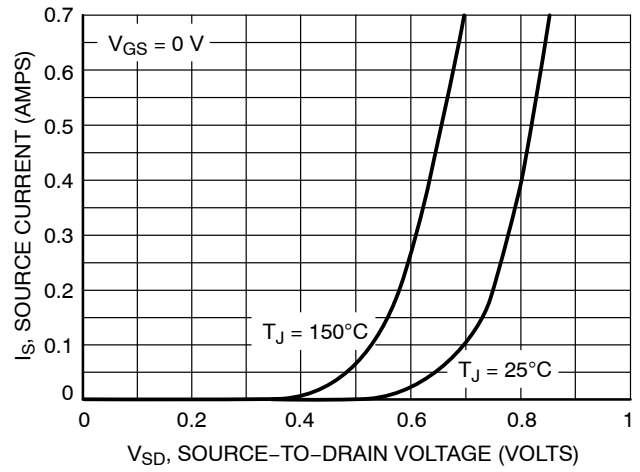


Figure 8. Diode Forward Voltage vs. Current

TYPICAL P-CHANNEL PERFORMANCE CURVES ($T_J = 25^\circ\text{C}$ UNLESS OTHERWISE NOTED) (continued)

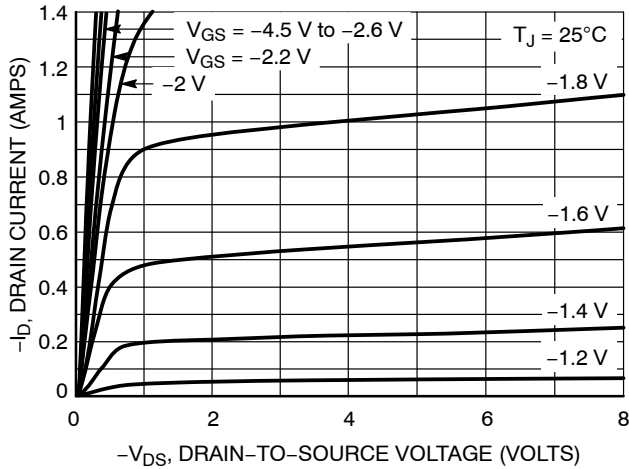


Figure 9. On-Region Characteristics

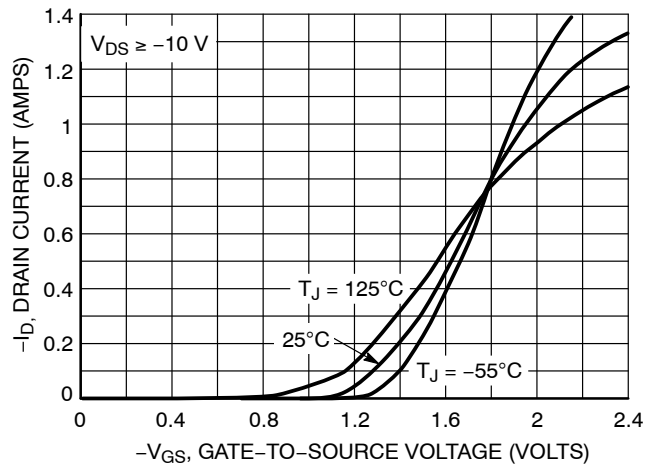


Figure 10. Transfer Characteristics

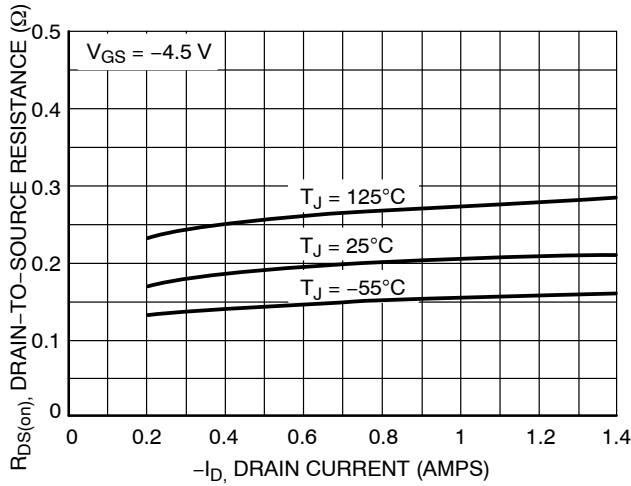


Figure 11. On-Resistance vs. Drain Current and Temperature

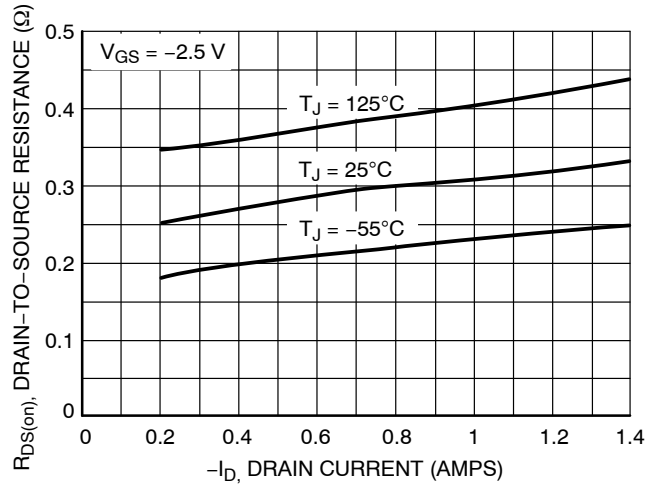


Figure 12. On-Resistance vs. Drain Current and Temperature

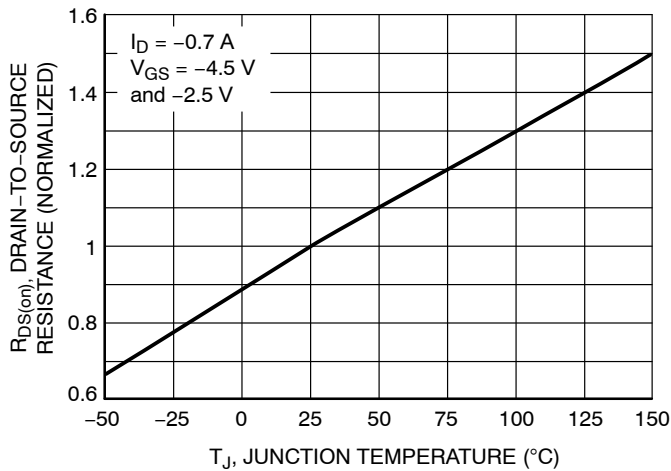


Figure 13. On-Resistance Variation with Temperature

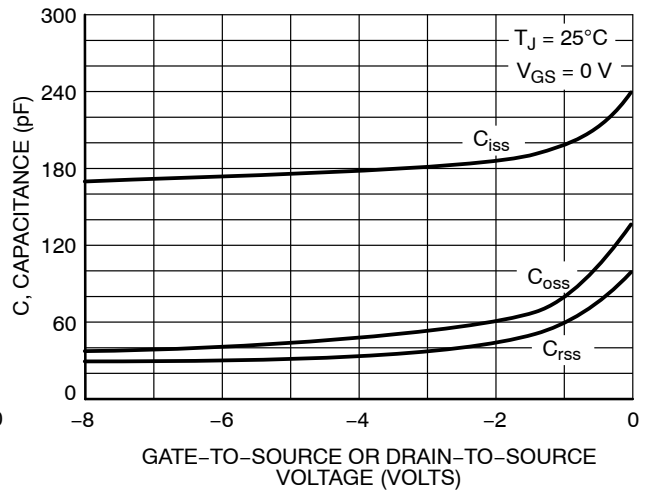


Figure 14. Capacitance Variation

TYPICAL P-CHANNEL PERFORMANCE CURVES ($T_J = 25^\circ\text{C}$ UNLESS OTHERWISE NOTED) (continued)

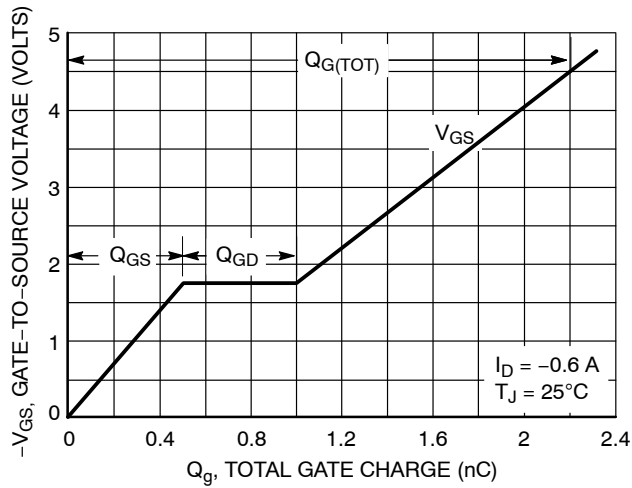


Figure 15. Gate-to-Source and Drain-to-Source Voltage vs. Total Charge

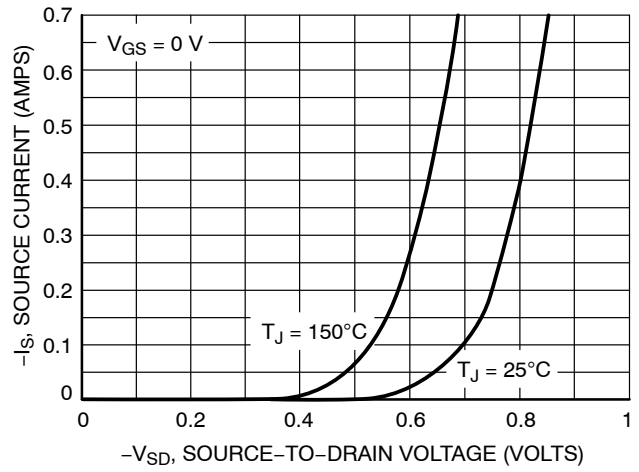


Figure 16. Diode Forward Voltage vs. Current

NTJD4105C

ORDERING INFORMATION

Device	Package	Shipping [†]
NTJD4105CT1G	SOT-363 (Pb-Free)	3000 / Tape & Reel
NTJD4105CT2G	SOT-363 (Pb-Free)	3000 / Tape & Reel

DISCONTINUED (Note 4)

NTJD4105CT1	SOT-363	3000 / Tape & Reel
NTJD4105CT2	SOT-363	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](#).

4. **DISCONTINUED:** These devices are not recommended for new design. Please contact your **onsemi** representative for information. The most current information on these devices may be available on www.onsemi.com.

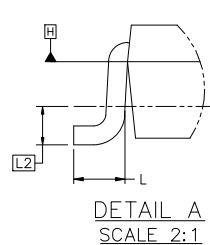
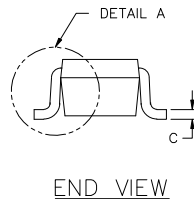
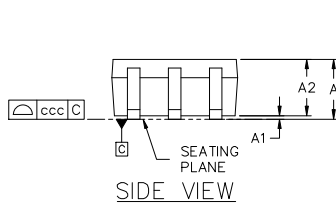
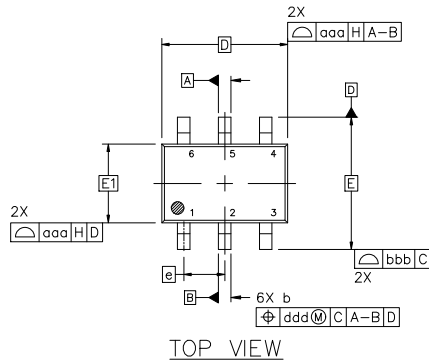


SC-88 2.00x1.25x0.90, 0.65P
CASE 419B-02
ISSUE Z

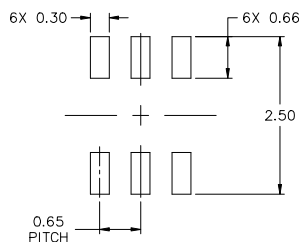
DATE 18 APR 2024

NOTES:

1. DIMENSIONING AND TOLERANCING CONFORM TO ASME Y14.5-2018.
2. ALL DIMENSION ARE IN MILLIMETERS.
3. DIMENSIONS D AND E1 DO NOT INCLUDE MOLD FLASH, PROTRUSIONS, OR GATE BURRS. MOLD FLASH, PROTRUSIONS, OR GATE BURRS SHALL NOT EXCEED 0.20 PER END.
4. DIMENSIONS D AND E1 AT THE OUTERMOST EXTREMES OF THE PLASTIC BODY AND DATUM H.
5. DATUMS A AND B ARE DETERMINED AT DATUM H.
6. DIMENSIONS b AND c APPLY TO THE FLAT SECTION OF THE LEAD BETWEEN 0.08 AND 0.15 FROM THE TIP.
7. DIMENSION b DOES NOT INCLUDE DAMBAR PROTRUSION. ALLOWABLE DAMBAR PROTRUSION SHALL BE 0.08 TOTAL IN EXCESS OF DIMENSION b AT MAXIMUM MATERIAL CONDITION. THE DAMBAR CANNOT BE LOCATED ON THE LOWER RADIUS OF THE FOOT.



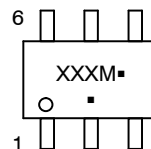
DIM	MILLIMETERS		
	MIN.	NOM.	MAX.
A	---	---	1.10
A1	0.00	---	0.10
A2	0.70	0.90	1.00
b	0.15	0.20	0.25
c	0.08	0.15	0.22
D	2.00 BSC		
E	2.10 BSC		
E1	1.25 BSC		
e	0.65 BSC		
L	0.26	0.36	0.46
L2	0.15 BSC		
aaa	0.15		
bbb	0.30		
ccc	0.10		
ddd	0.10		



RECOMMENDED MOUNTING FOOTPRINT*

* FOR ADDITIONAL INFORMATION ON OUR Pb-FREE STRATEGY AND SOLDERING DETAILS, PLEASE DOWNLOAD THE ONSEMI SOLDERING AND MOUNTING TECHNIQUES REFERENCE MANUAL, SOLDERRM/D.

GENERIC
MARKING DIAGRAM*



XXX = Specific Device Code
M = Date Code*
▪ = Pb-Free Package

(Note: Microdot may be in either location)

*Date Code orientation and/or position may vary depending upon manufacturing location.

*This information is generic. Please refer to device data sheet for actual part marking. Pb-Free indicator, "G" or microdot "▪", may or may not be present. Some products may not follow the Generic Marking.

STYLES ON PAGE 2

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SC-88 2.00x1.25x0.90, 0.65P
CASE 419B-02
ISSUE Z

DATE 18 APR 2024

STYLE 1: PIN 1. EMITTER 2 2. BASE 2 3. COLLECTOR 1 4. EMITTER 1 5. BASE 1 6. COLLECTOR 2	STYLE 2: CANCELLED	STYLE 3: CANCELLED	STYLE 4: PIN 1. CATHODE 2. CATHODE 3. COLLECTOR 4. EMITTER 5. BASE 6. ANODE	STYLE 5: PIN 1. ANODE 2. ANODE 3. COLLECTOR 4. EMITTER 5. BASE 6. CATHODE	STYLE 6: PIN 1. ANODE 2 2. N/C 3. CATHODE 1 4. ANODE 1 5. N/C 6. CATHODE 2
STYLE 7: PIN 1. SOURCE 2 2. DRAIN 2 3. GATE 1 4. SOURCE 1 5. DRAIN 1 6. GATE 2	STYLE 8: CANCELLED	STYLE 9: PIN 1. EMITTER 2 2. EMITTER 1 3. COLLECTOR 1 4. BASE 1 5. BASE 2 6. COLLECTOR 2	STYLE 10: PIN 1. SOURCE 2 2. SOURCE 1 3. GATE 1 4. DRAIN 1 5. DRAIN 2 6. GATE 2	STYLE 11: PIN 1. CATHODE 2 2. CATHODE 2 3. ANODE 1 4. CATHODE 1 5. CATHODE 1 6. ANODE 2	STYLE 12: PIN 1. ANODE 2 2. ANODE 2 3. CATHODE 1 4. ANODE 1 5. ANODE 1 6. CATHODE 2
STYLE 13: PIN 1. ANODE 2. N/C 3. COLLECTOR 4. EMITTER 5. BASE 6. CATHODE	STYLE 14: PIN 1. VREF 2. GND 3. GND 4. IOUT 5. VEN 6. VCC	STYLE 15: PIN 1. ANODE 1 2. ANODE 2 3. ANODE 3 4. CATHODE 3 5. CATHODE 2 6. CATHODE 1	STYLE 16: PIN 1. BASE 1 2. EMITTER 2 3. COLLECTOR 2 4. BASE 2 5. EMITTER 1 6. COLLECTOR 1	STYLE 17: PIN 1. BASE 1 2. EMITTER 1 3. COLLECTOR 2 4. BASE 2 5. EMITTER 2 6. COLLECTOR 1	STYLE 18: PIN 1. VIN1 2. VCC 3. VOUT2 4. VIN2 5. GND 6. VOUT1
STYLE 19: PIN 1. I OUT 2. GND 3. GND 4. V CC 5. V EN 6. V REF	STYLE 20: PIN 1. COLLECTOR 2. COLLECTOR 3. BASE 4. EMITTER 5. COLLECTOR 6. COLLECTOR	STYLE 21: PIN 1. ANODE 1 2. N/C 3. ANODE 2 4. CATHODE 2 5. N/C 6. CATHODE 1	STYLE 22: PIN 1. D1 (i) 2. GND 3. D2 (i) 4. D2 (c) 5. VBUS 6. D1 (c)	STYLE 23: PIN 1. Vn 2. CH1 3. Vp 4. N/C 5. CH2 6. N/C	STYLE 24: PIN 1. CATHODE 2. ANODE 3. CATHODE 4. CATHODE 5. CATHODE 6. CATHODE
STYLE 25: PIN 1. BASE 1 2. CATHODE 3. COLLECTOR 2 4. BASE 2 5. EMITTER 6. COLLECTOR 1	STYLE 26: PIN 1. SOURCE 1 2. GATE 1 3. DRAIN 2 4. SOURCE 2 5. GATE 2 6. DRAIN 1	STYLE 27: PIN 1. BASE 2 2. BASE 1 3. COLLECTOR 1 4. EMITTER 1 5. EMITTER 2 6. COLLECTOR 2	STYLE 28: PIN 1. DRAIN 2. DRAIN 3. GATE 4. SOURCE 5. DRAIN 6. DRAIN	STYLE 29: PIN 1. ANODE 2. ANODE 3. COLLECTOR 4. EMITTER 5. BASE/ANODE 6. CATHODE	STYLE 30: PIN 1. SOURCE 1 2. DRAIN 2 3. DRAIN 2 4. SOURCE 2 5. GATE 1 6. DRAIN 1

Note: Please refer to datasheet for style callout. If style type is not called out in the datasheet refer to the device datasheet pinout or pin assignment.

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