

NTGS3443B

MOSFET – Power, Single, P-Channel, TSOP-6 -20 V, -4.2 A

Features

- Low $R_{DS(on)}$ in TSOP-6 Package
- 2.5 V Gate Rating
- Fast Switching
- This is a Pb-Free Device

Applications

- Optimized for Battery and Load Management Applications in Portable Equipment
- Li Ion Battery Linear Mode Charging
- High Side Load Switch
- HDD Switching Circuits, Camera Phone, etc.

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

Parameter		Symbol	Value	Unit	
Drain-to-Source Voltage		V_{DSS}	-20	V	
Gate-to-Source Voltage		V_{GS}	± 12	V	
Continuous Drain Current (Note 1)	Steady State	I_D	$T_A = 25^\circ\text{C}$	-3.7	A
			$T_A = 85^\circ\text{C}$	-2.7	
	$t \leq 5 \text{ s}$	$T_A = 25^\circ\text{C}$	-4.2		
Power Dissipation (Note 1)	Steady State	P_D	$T_A = 25^\circ\text{C}$	1.25	W
	$t \leq 5 \text{ s}$			1.6	
Continuous Drain Current (Note 2)	Steady State	I_D	$T_A = 25^\circ\text{C}$	-2.7	A
			$T_A = 85^\circ\text{C}$	-2.0	
Power Dissipation (Note 2)	Steady State	P_D	$T_A = 25^\circ\text{C}$	0.7	W
Pulsed Drain Current	$t_p = 10 \mu\text{s}$	I_{DM}	-15	A	
Operating Junction and Storage Temperature		T_J, T_{STG}	-55 to 150	$^\circ\text{C}$	
Lead Temperature for Soldering Purposes (1/8" from case for 10 s)		T_L	260	$^\circ\text{C}$	

Stresses exceeding Maximum Ratings may damage the device. Maximum Ratings are stress ratings only. Functional operation above the Recommended Operating Conditions is not implied. Extended exposure to stresses above the Recommended Operating Conditions may affect device reliability.

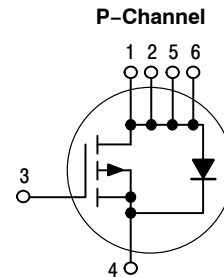
1. Surface-mounted on FR4 board using 1 in sq pad size. (Cu area = 1.127 in sq [2 oz] including traces)
2. Surface-mounted on FR4 board using the minimum recommended pad size. (Cu area = 0.0775 in sq)



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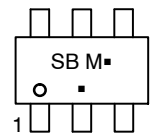
<http://onsemi.com>

$V_{(BR)DSS}$	$R_{DS(ON)} \text{ MAX}$	$I_D \text{ MAX}$
-20 V	60 m Ω @ -4.5 V	-3.7 A
	90 m Ω @ -2.7 V	-3.1 A
	100 m Ω @ -2.5 V	-3.0 A



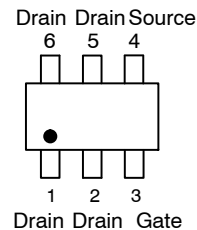
TSOP-6
CASE 318G
STYLE 1

MARKING DIAGRAM



SB = Device Code
M = Date Code
▪ = Pb-Free Package
(Note: Microdot may be in either location)

PIN ASSIGNMENT



ORDERING INFORMATION

Device	Package	Shipping†
NTGS3443BT1G	TSOP-6 (Pb-Free)	3000 / 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.

NTGS3443B

THERMAL RESISTANCE MAXIMUM RATINGS

Parameter	Symbol	Value	Unit
Junction-to-Ambient – Steady State (Note 3)	$R_{\theta JA}$	100	°C/W
Junction-to-Ambient – $t \leq 5$ s (Note 3)	$R_{\theta JA}$	80	
Junction-to-Ambient – Steady State (Note 4)	$R_{\theta JA}$	190	

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

4. Surface-mounted on FR4 board using the minimum recommended pad size (Cu area = 0.0775 in sq).

ELECTRICAL CHARACTERISTICS ($T_J = 25^\circ\text{C}$ unless otherwise specified)

Parameter	Symbol	Test Condition	Min	Typ	Max	Unit
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OFF CHARACTERISTICS

Drain-to-Source Breakdown Voltage	$V_{(BR)DSS}$	$V_{GS} = 0$ V, $I_D = -250$ μA	-20			V
Drain-to-Source Breakdown Voltage Temperature Coefficient	$V_{(BR)DSS}/T_J$	$I_D = -250$ μA , Reference 25°C		-15		mV/°C
Zero Gate Voltage Drain Current	I_{DSS}	$V_{GS} = 0$ V, $V_{DS} = -20$ V			-1.0	μA
		$T_J = 25^\circ\text{C}$				
		$T_J = 70^\circ\text{C}$			-5.0	
Gate-to-Source Leakage Current	I_{GSS}	$V_{DS} = 0$ V, $V_{GS} = \pm 12$ V			± 0.1	μA

ON CHARACTERISTICS (Note 5)

Gate Threshold Voltage	$V_{GS(TH)}$	$V_{GS} = V_{DS}$, $I_D = -250$ μA	-0.6		-1.4	V
Negative Threshold Temperature Coefficient	$V_{GS(TH)}/T_J$			3.3		mV/°C
Drain-to-Source On Resistance	$R_{DS(on)}$	$V_{GS} = -4.5$ V, $I_D = -3.7$ A		45	60	m Ω
		$V_{GS} = -2.7$ V, $I_D = -3.1$ A		65	90	
		$V_{GS} = -2.5$ V, $I_D = -3.0$ A		70	100	
Forward Transconductance	g_{FS}	$V_{DS} = -10$ V, $I_D = -3.7$ A		7.0		S

CHARGES, CAPACITANCES AND GATE RESISTANCE

Input Capacitance	C_{ISS}	$V_{GS} = 0$ V, $f = 1$ MHz, $V_{DS} = -10$ V		819		pF
Output Capacitance	C_{OSS}			157		
Reverse Transfer Capacitance	C_{RSS}			103		
Total Gate Charge	$Q_{G(TOT)}$	$V_{GS} = -4.5$ V, $V_{DS} = -10$ V; $I_D = -3.7$ A		8.0	11	nC
Threshold Gate Charge	$Q_{G(TH)}$			0.6		
Gate-to-Source Charge	Q_{GS}			1.7		
Gate-to-Drain Charge	Q_{GD}			2.4		
Gate Resistance	R_G			11		

SWITCHING CHARACTERISTICS (Note 6)

Turn-On Delay Time	$t_{d(ON)}$	$V_{GS} = -4.5$ V, $V_{DD} = -10$ V, $I_D = -1.0$ A, $R_G = 6.0$ Ω		10	15	ns
Rise Time	t_r			7.0	11	
Turn-Off Delay Time	$t_{d(OFF)}$			47	70	
Fall Time	t_f			25	40	

DRAIN-SOURCE DIODE CHARACTERISTICS

Forward Diode Voltage	V_{SD}	$V_{GS} = 0$ V, $I_S = -1.7$ A	$T_J = 25^\circ\text{C}$	-0.8	-1.2	V
Reverse Recovery Time	t_{RR}	$V_{GS} = 0$ V, $dI_S/dt = 100$ A/ μs , $I_S = -1.7$ A		15	30	ns

5. Pulse Test: pulse width ≤ 300 μs , duty cycle $\leq 2\%$

6. Switching characteristics are independent of operating junction temperatures

NTGS3443B

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

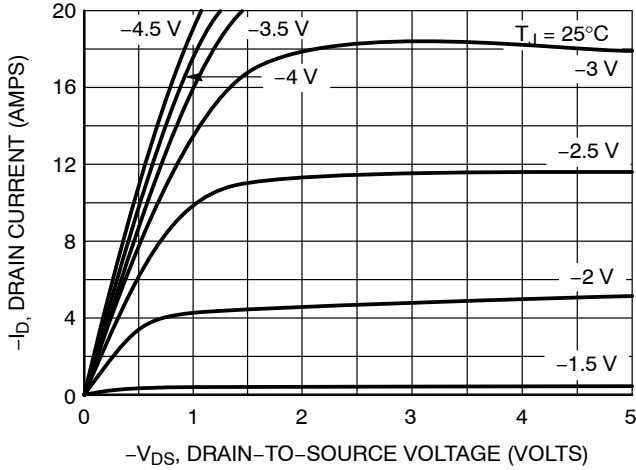


Figure 1. On-Region Characteristics

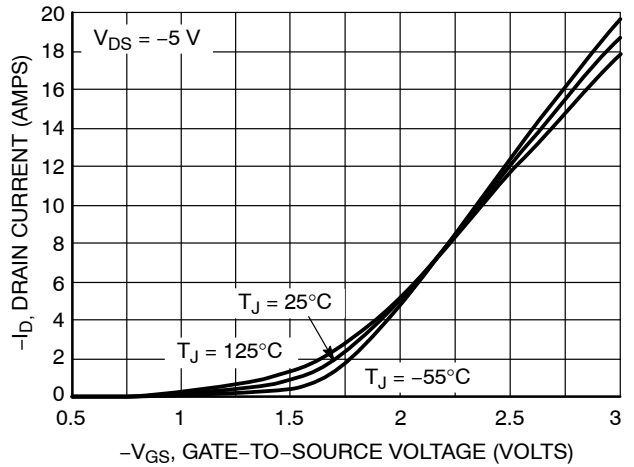


Figure 2. Transfer Characteristics

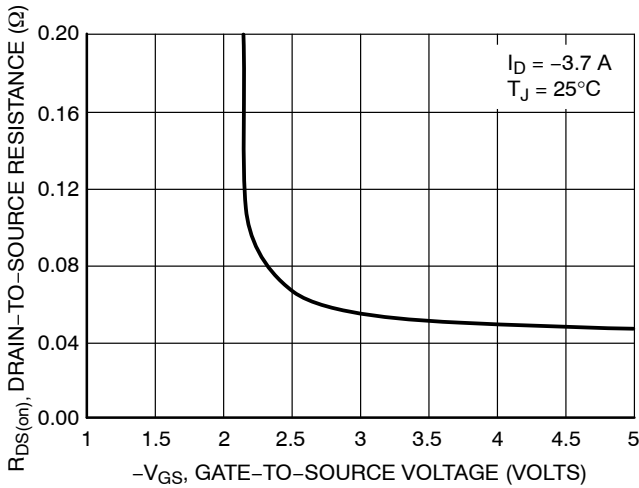


Figure 3. On-Resistance vs. Gate-to-Source Voltage

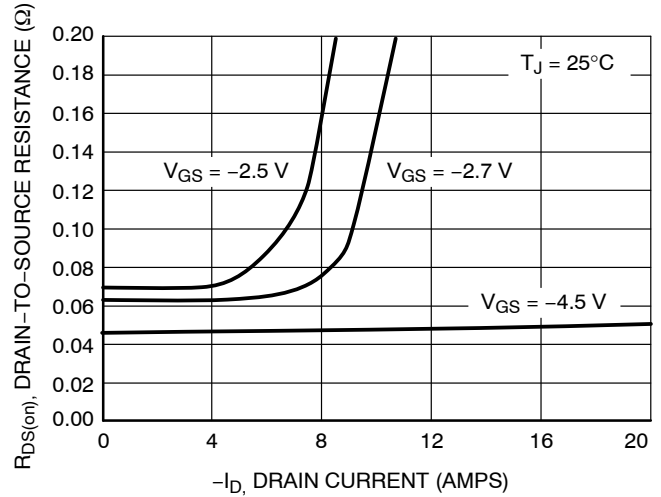


Figure 4. On-Resistance vs. Drain Current and Gate Voltage

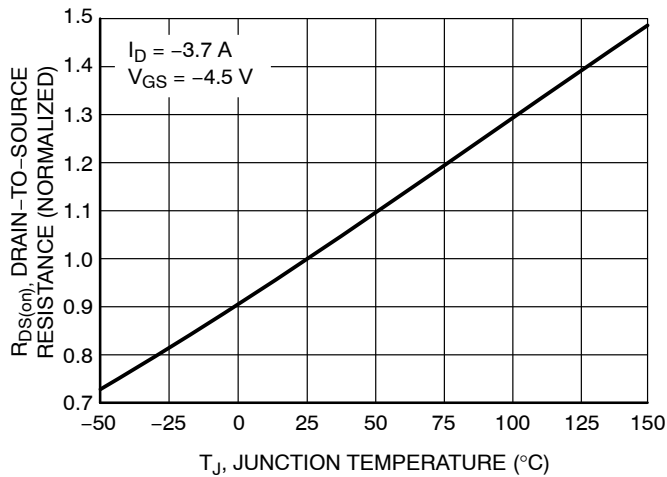


Figure 5. On-Resistance Variation with Temperature

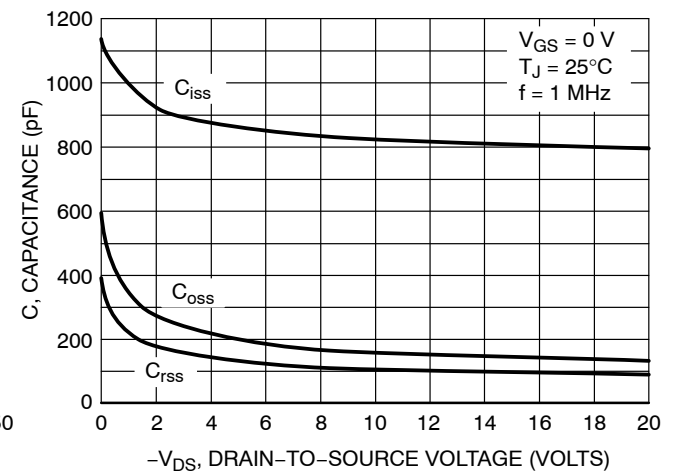


Figure 6. Capacitance Variation

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

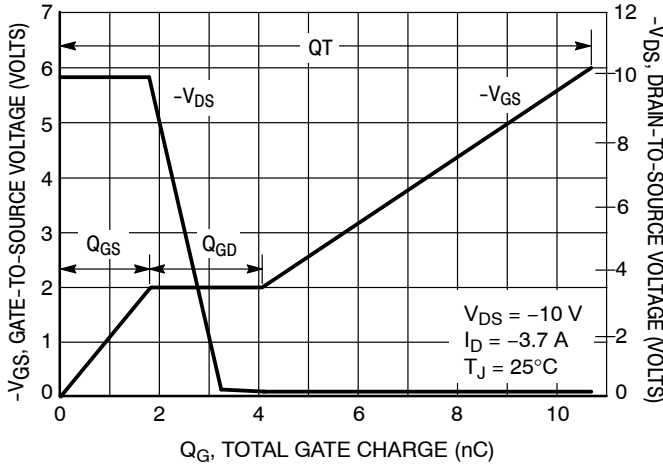


Figure 7. Gate-to-Source and Drain-to-Source Voltage vs. Total Charge

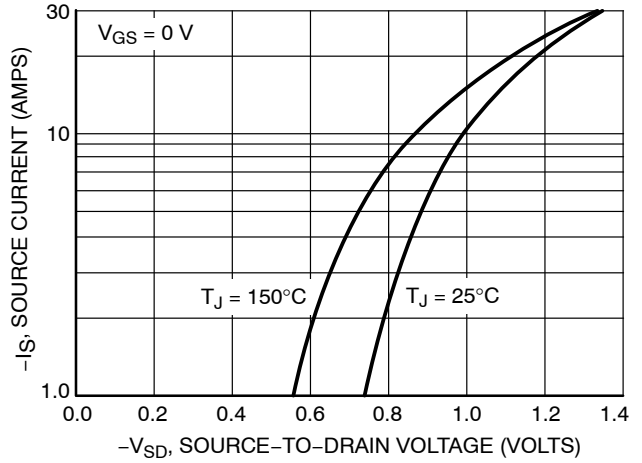


Figure 8. Diode Forward Voltage vs. Current

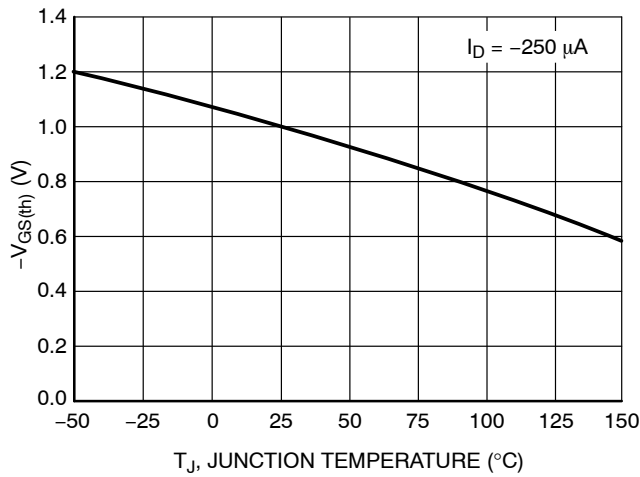


Figure 9. Threshold Voltage

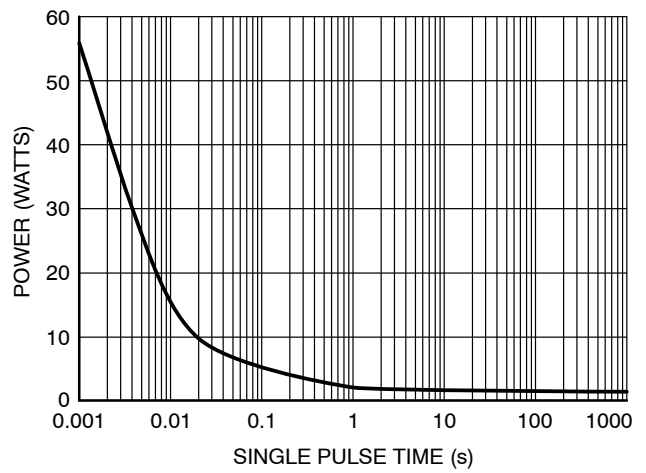


Figure 10. Single Pulse Maximum Power Dissipation

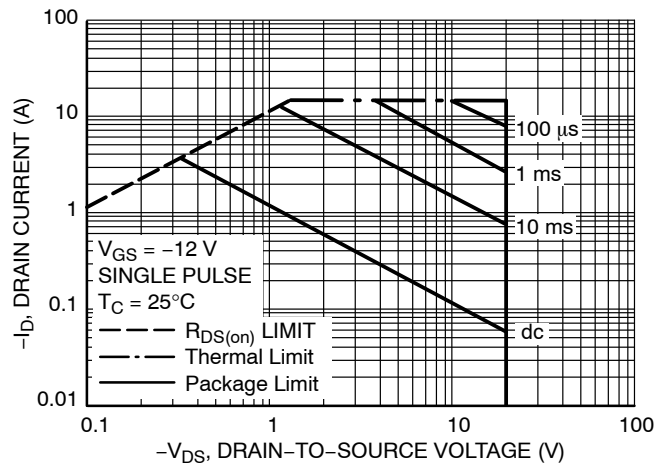


Figure 11. Maximum Rated Forward Biased Safe Operating Area

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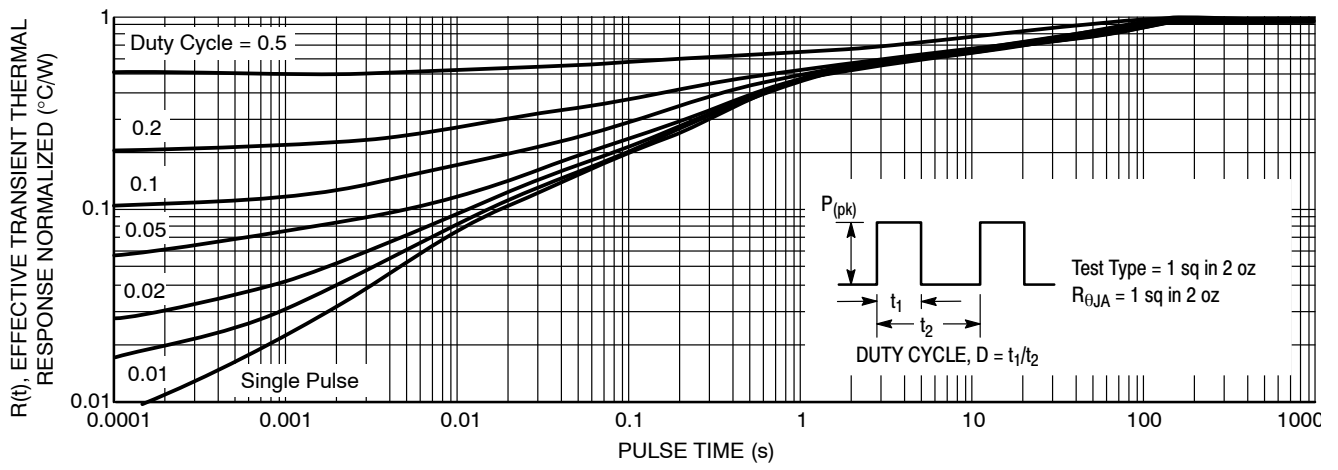
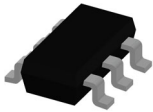


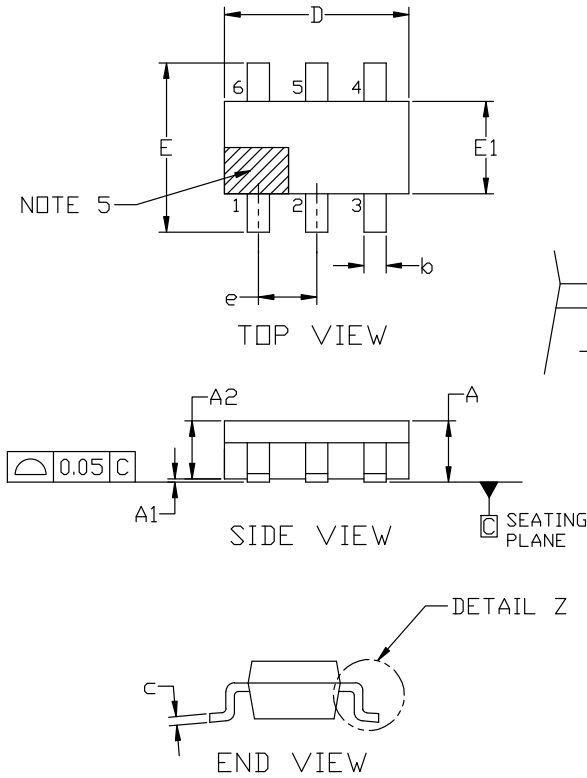
Figure 12. FET Thermal Response

MECHANICAL CASE OUTLINE PACKAGE DIMENSIONS



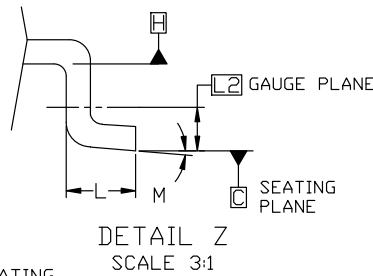
TSOP-6 3.00x1.50x0.90, 0.95P
CASE 318G
ISSUE W

DATE 26 FEB 2024

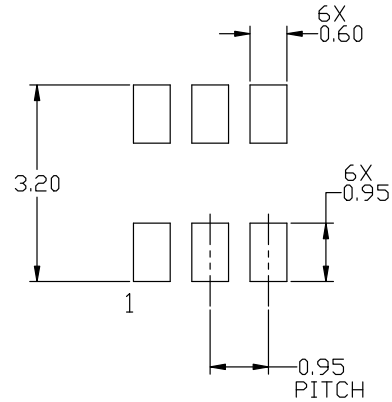


NOTES:

1. DIMENSIONING AND TOLERANCING PER ASME Y14.5M, 2018.
2. CONTROLLING DIMENSION: MILLIMETERS.
3. MAXIMUM LEAD THICKNESS INCLUDES LEAD FINISH. MINIMUM LEAD THICKNESS IS THE MINIMUM THICKNESS OF BASE MATERIAL.
4. DIMENSIONS D AND E1 DO NOT INCLUDE MOLD FLASH, PROTRUSIONS, OR GATE BURRS. MOLD FLASH, PROTRUSIONS, OR GATE BURRS SHALL NOT EXCEED 0.15 PER SIDE. DIMENSIONS D AND E1 ARE DETERMINED AT DATUM H.
5. PIN 1 INDICATOR MUST BE LOCATED IN THE INDICATED ZONE



MILLIMETERS			
DIM	MIN	NOM	MAX
A	0.90	1.00	1.10
A1	0.01	0.06	0.10
A2	0.80	0.90	1.00
b	0.25	0.38	0.50
c	0.10	0.18	0.26
D	2.90	3.00	3.10
E	2.50	2.75	3.00
E1	1.30	1.50	1.70
e	0.85	0.95	1.05
L	0.20	0.40	0.60
L2	0.25 BSC		
M	0°	---	10°



RECOMMENDED MOUNTING FOOTPRINT

*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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DESCRIPTION:	TSOP-6 3.00x1.50x0.90, 0.95P	PAGE 1 OF 2

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MECHANICAL CASE OUTLINE

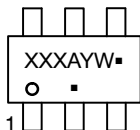
PACKAGE DIMENSIONS



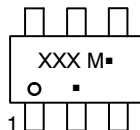
TSOP-6 3.00x1.50x0.90, 0.95P
CASE 318G
ISSUE W

DATE 26 FEB 2024

GENERIC MARKING DIAGRAM*



IC



STANDARD

XXX = Specific Device Code
A = Assembly Location
Y = Year
W = Work Week
▪ = Pb-Free Package

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

*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.

- | | | | | | |
|--|--|---|---|---|--|
| <p>STYLE 1:
PIN 1. DRAIN
2. DRAIN
3. GATE
4. SOURCE
5. DRAIN
6. DRAIN</p> | <p>STYLE 2:
PIN 1. EMITTER 2
2. BASE 1
3. COLLECTOR 1
4. EMITTER 1
5. BASE 2
6. COLLECTOR 2</p> | <p>STYLE 3:
PIN 1. ENABLE
2. N/C
3. R BOOST
4. Vz
5. V in
6. V out</p> | <p>STYLE 4:
PIN 1. N/C
2. V in
3. NOT USED
4. GROUND
5. ENABLE
6. LOAD</p> | <p>STYLE 5:
PIN 1. EMITTER 2
2. BASE 2
3. COLLECTOR 1
4. EMITTER 1
5. BASE 1
6. COLLECTOR 2</p> | <p>STYLE 6:
PIN 1. COLLECTOR
2. COLLECTOR
3. BASE
4. EMITTER
5. COLLECTOR
6. COLLECTOR</p> |
| <p>STYLE 7:
PIN 1. COLLECTOR
2. COLLECTOR
3. BASE
4. N/C
5. COLLECTOR
6. EMITTER</p> | <p>STYLE 8:
PIN 1. Vbus
2. D(in)
3. D(in)+
4. D(out)+
5. D(out)
6. GND</p> | <p>STYLE 9:
PIN 1. LOW VOLTAGE GATE
2. DRAIN
3. SOURCE
4. DRAIN
5. DRAIN
6. HIGH VOLTAGE GATE</p> | <p>STYLE 10:
PIN 1. D(OUT)+
2. GND
3. D(OUT)-
4. D(IN)-
5. VBUS
6. D(IN)+</p> | <p>STYLE 11:
PIN 1. SOURCE 1
2. DRAIN 2
3. DRAIN 2
4. SOURCE 2
5. GATE 1
6. DRAIN 1/GATE 2</p> | <p>STYLE 12:
PIN 1. I/O
2. GROUND
3. I/O
4. I/O
5. VCC
6. I/O</p> |
| <p>STYLE 13:
PIN 1. GATE 1
2. SOURCE 2
3. GATE 2
4. DRAIN 2
5. SOURCE 1
6. DRAIN 1</p> | <p>STYLE 14:
PIN 1. ANODE
2. SOURCE
3. GATE
4. CATHODE/DRAIN
5. CATHODE/DRAIN
6. CATHODE/DRAIN</p> | <p>STYLE 15:
PIN 1. ANODE
2. SOURCE
3. GATE
4. DRAIN
5. N/C
6. CATHODE</p> | <p>STYLE 16:
PIN 1. ANODE/CATHODE
2. BASE
3. EMITTER
4. COLLECTOR
5. ANODE
6. CATHODE</p> | <p>STYLE 17:
PIN 1. EMITTER
2. BASE
3. ANODE/CATHODE
4. ANODE
5. CATHODE
6. COLLECTOR</p> | |

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