NTGS3433T1

MOSFET – P-Channel, TSOP-6

-3.3 A, -12 V

ON Semiconductor®

http://onsemi.com

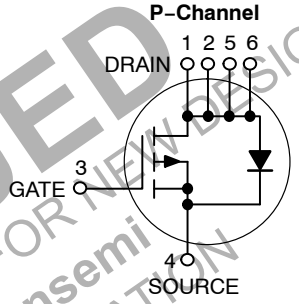
$V_{(BR)DSS}$	$R_{DS(on)}$ TYP	I_D Max
−12 V	75 mΩ @ −4.5 V	−3.3 A

Features

- Ultra Low $R_{DS(on)}$
- Higher Efficiency Extending Battery Life
- Miniature TSOP−6 Surface Mount Package
- Pb−Free Package is Available

Applications

- Power Management in Portable and Battery−Powered Products, i.e.: Cellular and Cordless Telephones, and PCMCIA Cards



MAXIMUM RATINGS (T_J = 25°C unless otherwise noted.)

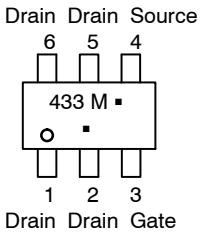
Rating	Symbol	Value	Unit
Drain−to−Source Voltage	V_{DSS}	−12	Volts
Gate−to−Source Voltage − Continuous	V_{GS}	±8.0	Volts
Thermal Resistance Junction−to−Ambient (Note 1)	$R_{\theta JA}$	62.5	°C/W
Total Power Dissipation @ T_A = 25°C	P_d	2.0	Watts
Drain Current		−3.3	Amps
− Continuous @ T_A = 25°C	I_D		
− Pulsed Drain Current (T_p < 10 μS)	I_{DM}	−20	Amps
Maximum Operating Power Dissipation	P_d	1.0	Watts
Maximum Operating Drain Current	I_D	−2.35	Amps
Thermal Resistance Junction−to−Ambient (Note 2)	$R_{\theta JA}$	128	°C/W
Total Power Dissipation @ T_A = 25°C	P_d	1.0	Watts
Drain Current			
− Continuous @ T_A = 25°C	I_D	−2.35	Amps
− Pulsed Drain Current (T_p < 10 μS)	I_{DM}	−14	Amps
Maximum Operating Power Dissipation	P_d	0.5	Watts
Maximum Operating Drain Current	I_D	−1.65	Amps
Operating and Storage Temperature Range	T_J, T_{stg}	−55 to 150	°C
Maximum Lead Temperature for Soldering Purposes for 10 Seconds	T_L	260	°C

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. Mounted onto a 2″ square FR−4 board (1 in sq, 2 oz. Cu 0.06″ thick single sided), t < 5.0 seconds.
2. Mounted onto a 2″ square FR−4 board (1 in sq, 2 oz. Cu 0.06″ thick single sided), operating to steady state.

MARKING DIAGRAM & PIN ASSIGNMENT

TSOP−6
CASE 318G
STYLE 1



433 = Specific Device Code
M = Date Code*
▪ = Pb−Free Package

(Note: Microdot may be in either location)

*Date Code orientation may vary depending upon manufacturing location.

ORDERING INFORMATION

Device	Package	Shipping†
NTGS3433T1	TSOP−6	3000 Tape & Reel
NTGS3433T1G	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 Specification Brochure, BRD8011/D.

ELECTRICAL CHARACTERISTICS (T_A = 25°C unless otherwise noted) (Notes 3 & 4)

Characteristic		Symbol	Min	Typ	Max	Unit
OFF CHARACTERISTICS						
Drain−Source Breakdown Voltage (V_{GS} = 0 Vdc, I_D = −10 μA)		$V_{(BR)DSS}$	−12	–	–	Vdc
Zero Gate Voltage Drain Current (V_{GS} = 0 Vdc, V_{DS} = −8 Vdc, T_J = 25°C) (V_{GS} = 0 Vdc, V_{DS} = −8 Vdc, T_J = 70°C)		I_{DSS}	– –	– –	−1.0 −5.0	μAdc
Gate−Body Leakage Current (V_{GS} = −8.0 Vdc, V_{DS} = 0 Vdc)		I_{GSS}	–	–	−100	nAdc
Gate−Body Leakage Current (V_{GS} = +8.0 Vdc, V_{DS} = 0 Vdc)		I_{GSS}	–	–	100	nAdc
ON CHARACTERISTICS						
Gate Threshold Voltage (V_{DS} = V_{GS}, I_D = −250 μAdc)		$V_{GS(th)}$	−0.50	−0.70	−1.50	Vdc
Static Drain−Source On−State Resistance (V_{GS} = −4.5 Vdc, I_D = −3.3 Adc) (V_{GS} = −2.5 Vdc, I_D = −2.9 Adc)		$R_{DS(on)}$	– –	0.055 0.075	0.075 0.095	Ω
Forward Transconductance (V_{DS} = −10 Vdc, I_D = −3.3 Adc)		g_{FS}	–	7.0	–	mhos
DYNAMIC CHARACTERISTICS						
Total Gate Charge	(V_{DS} = −10 Vdc, V_{GS} = −4.5 Vdc, I_D = −3.3 Adc)	Q_{tot}	–	7.0	15	nC
Gate−Source Charge		Q_{gs}	–	2.0	–	
Gate−Drain Charge		Q_{gd}	–	3.5	–	
Input Capacitance	(V_{DS} = −5.0 Vdc, V_{GS} = 0 Vdc, f = 1.0 MHz)	C_{iss}	–	550	–	pF
Output Capacitance		C_{oss}	–	450	–	
Reverse Transfer Capacitance		C_{rss}	–	200	–	
SWITCHING CHARACTERISTICS						
Turn−On Delay Time	(V_{DD} = −10 Vdc, I_D = −1.0 Adc, V_{GS} = −4.5 Vdc, R_g = 6.0 Ω)	$t_{d(on)}$	–	20	30	ns
Rise Time		t_r	–	20	30	
Turn−Off Delay Time		$t_{d(off)}$	–	110	120	
Fall Time		t_f	–	100	115	
Reverse Recovery Time	(I_S = −1.7 Adc, dI_S/dt = 100 A/μs)	t_{rr}	–	30	–	ns
BODY−DRAIN DIODE RATINGS						
Diode Forward On−Voltage	(I_S = −1.7 Adc, V_{GS} = 0 Vdc)	V_{SD}	–	−0.80	−1.5	Vdc
Diode Forward On−Voltage	(I_S = −3.3 Adc, V_{GS} = 0 Vdc)	V_{SD}	–	−0.90	–	Vdc

3. Indicates Pulse Test: P.W. = 300 μsec max, Duty Cycle = 2%.
4. Class 1 ESD rated − Handling precautions to protect against electrostatic discharge are mandatory.

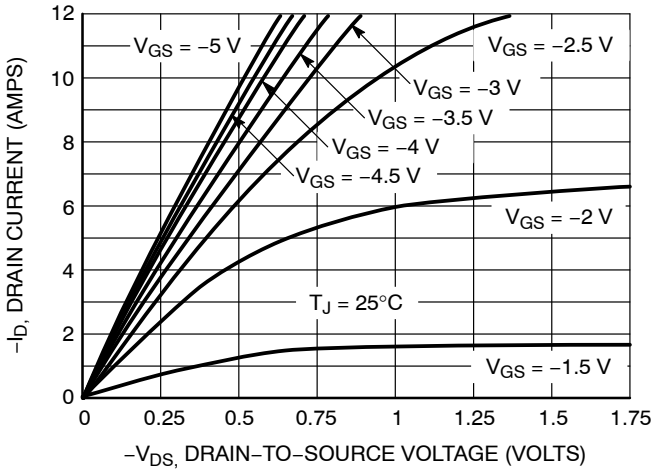


Figure 1. On−Region Characteristics

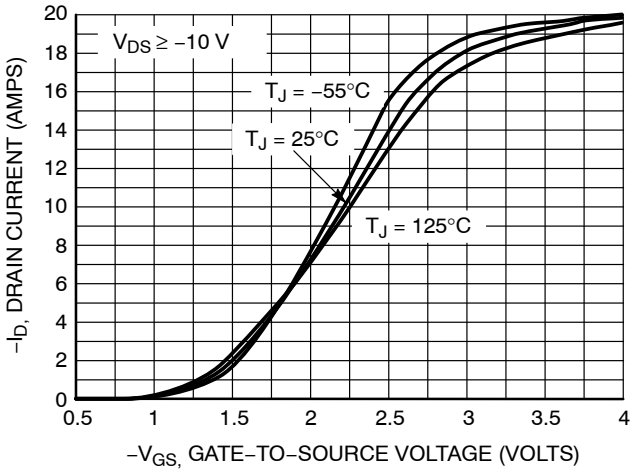


Figure 2. Transfer Characteristics

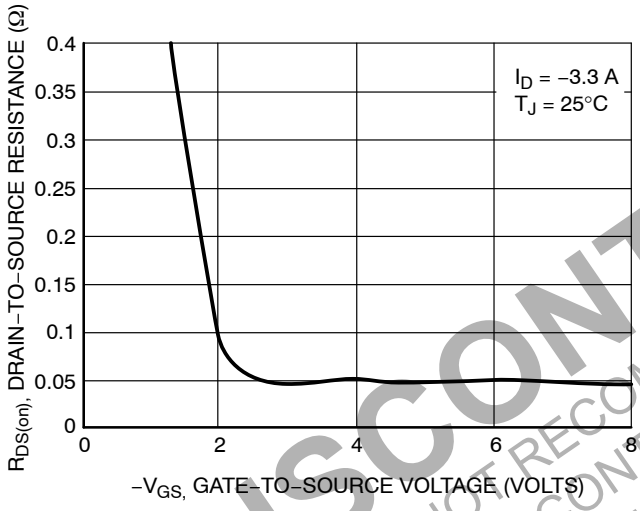


Figure 3. On−Resistance vs. Gate−to−Source Voltage

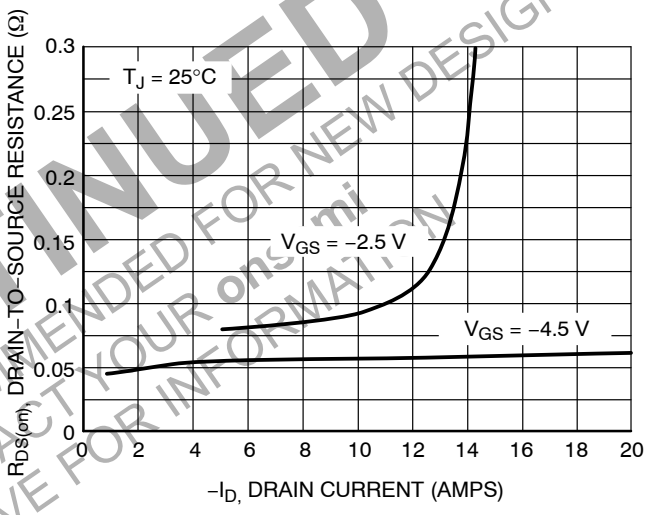


Figure 4. On−Resistance vs. Drain Current and Gate Voltage

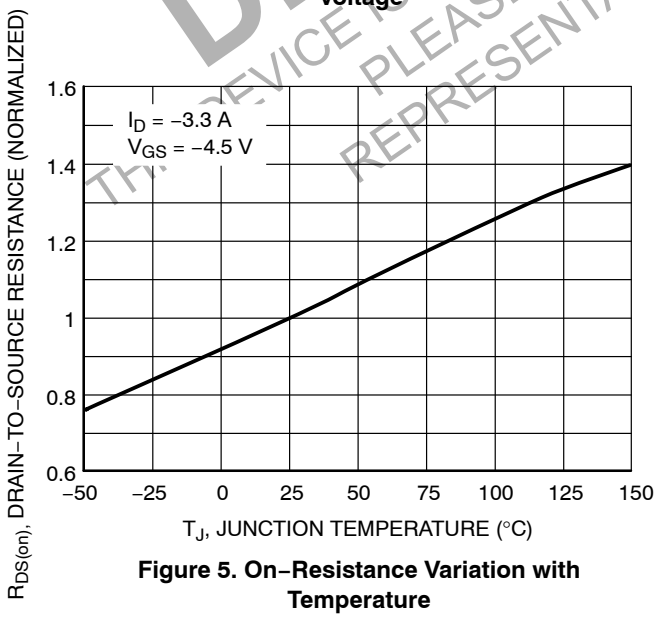


Figure 5. On−Resistance Variation with Temperature

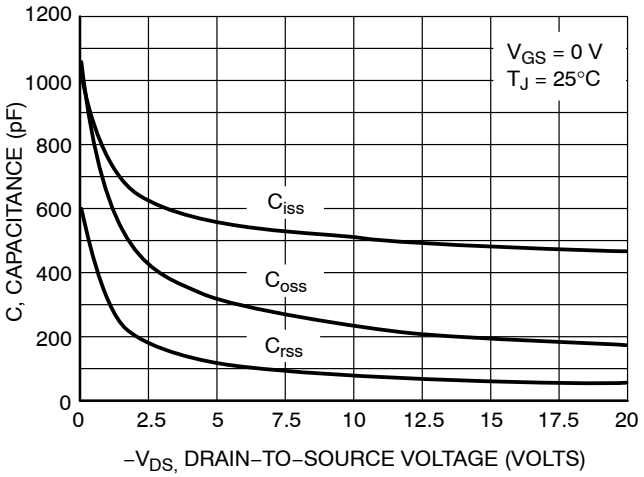


Figure 6. Capacitance Variation

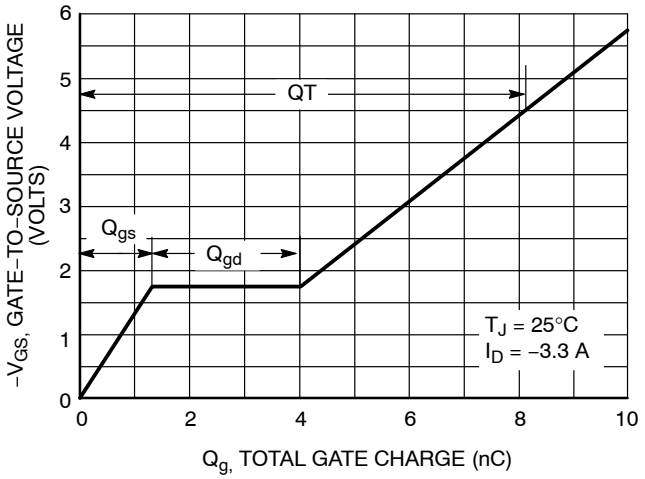


Figure 7. Gate−to−Source and Drain−to−Source Voltage vs. Total Charge

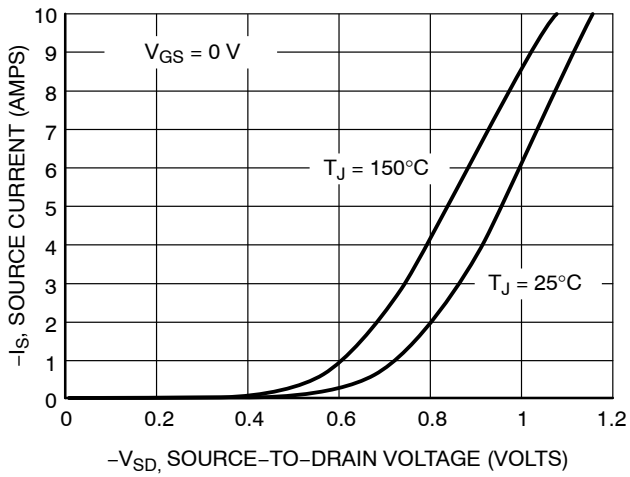


Figure 8. Diode Forward Voltage vs. Current

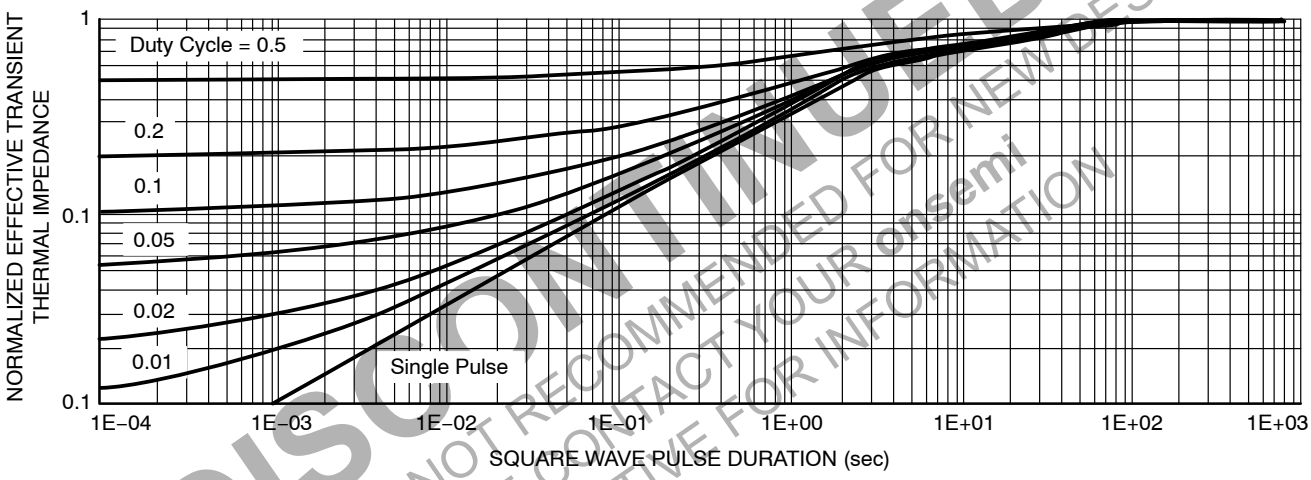


Figure 9. Normalized Thermal Transient Impedance, Junction−to−Ambient

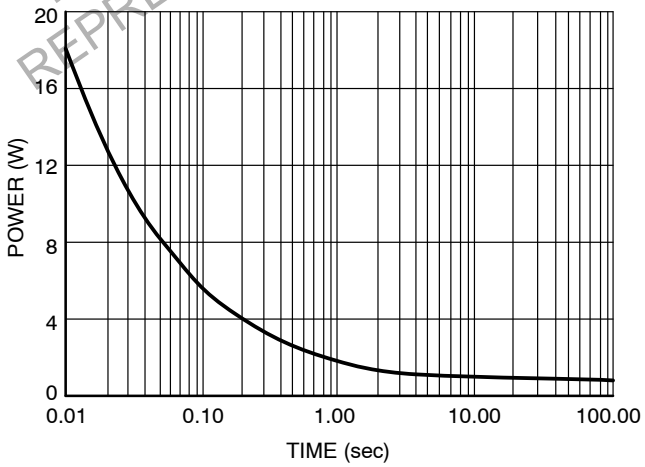
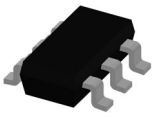


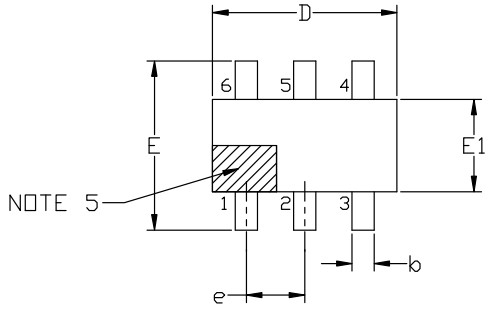
Figure 10. Single Pulse Power

MECHANICAL CASE OUTLINE
PACKAGE DIMENSIONS

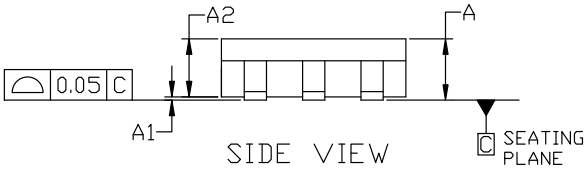


TSOP−6 3.00x1.50x0.90, 0.95P
CASE 318G
ISSUE W

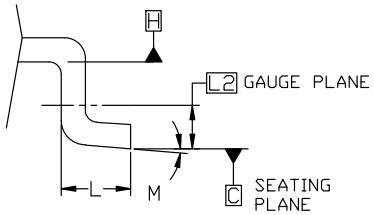
DATE 26 FEB 2024



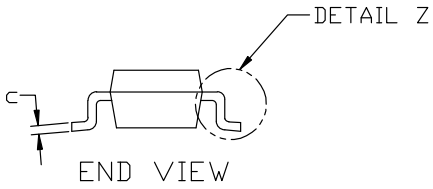
TOP VIEW



SIDE VIEW



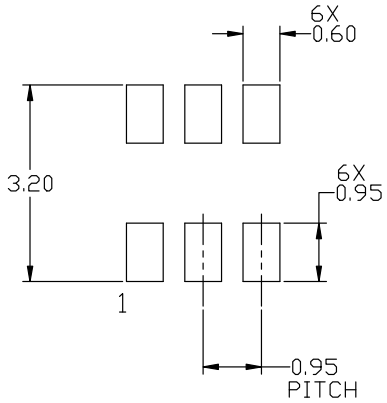
DETAIL Z
SCALE 3:1



END VIEW

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

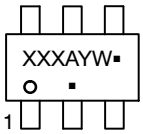
*For additional information on our Pb-Free strategy and soldering details, please download th e ON Semiconductor Soldering and Mounting Techniques Reference manual, SOLDERRM/D.

DOCUMENT NUMBER:	**98ASB14888C**	Electronic versions are uncontrolled except when accessed directly from the Document Repository. Printed versions are uncontrolled except when stamped "CONTROLLED COPY" in red.	
DESCRIPTION:	**TSOP−6 3.00x1.50x0.90, 0.95P**		**PAGE 1 OF 2**

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

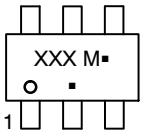
DATE 26 FEB 2024

GENERIC
MARKING DIAGRAM*



IC

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



STANDARD

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.

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

STYLE 2:
PIN 1. EMITTER 2
2. BASE 1
3. COLLECTOR 1
4. EMITTER 1
5. BASE 2
6. COLLECTOR 2

STYLE 3:
PIN 1. ENABLE
2. N/C
3. R BOOST
4. Vz
5. V in
6. V out

STYLE 4:
PIN 1. N/C
2. V in
3. NOT USED
4. GROUND
5. ENABLE
6. LOAD

STYLE 5:
PIN 1. EMITTER 2
2. BASE 2
3. COLLECTOR 1
4. EMITTER 1
5. BASE 1
6. COLLECTOR 2

STYLE 6:
PIN 1. COLLECTOR
2. COLLECTOR
3. BASE
4. EMITTER
5. COLLECTOR
6. COLLECTOR

STYLE 7:
PIN 1. COLLECTOR
2. COLLECTOR
3. BASE
4. N/C
5. COLLECTOR
6. EMITTER

STYLE 8:
PIN 1. Vbus
2. D(in)
3. D(in)+
4. D(out)+
5. D(out)
6. GND

STYLE 9:
PIN 1. LOW VOLTAGE GATE
2. DRAIN
3. SOURCE
4. DRAIN
5. DRAIN
6. HIGH VOLTAGE GATE

STYLE 10:
PIN 1. D(OUT)+
2. GND
3. D(OUT)−
4. D(IN)−
5. VBUS
6. D(IN)+

STYLE 11:
PIN 1. SOURCE 1
2. DRAIN 2
3. DRAIN 2
4. SOURCE 2
5. GATE 1
6. DRAIN 1/GATE 2

STYLE 12:
PIN 1. I/O
2. GROUND
3. I/O
4. I/O
5. VCC
6. I/O

STYLE 13:
PIN 1. GATE 1
2. SOURCE 2
3. GATE 2
4. DRAIN 2
5. SOURCE 1
6. DRAIN 1

STYLE 14:
PIN 1. ANODE
2. SOURCE
3. GATE
4. CATHODE/DRAIN
5. CATHODE/DRAIN
6. CATHODE/DRAIN

STYLE 15:
PIN 1. ANODE
2. SOURCE
3. GATE
4. DRAIN
5. N/C
6. CATHODE

STYLE 16:
PIN 1. ANODE/CATHODE
2. BASE
3. EMITTER
4. COLLECTOR
5. ANODE
6. CATHODE

STYLE 17:
PIN 1. EMITTER
2. BASE
3. ANODE/CATHODE
4. ANODE
5. CATHODE
6. COLLECTOR

ADDITIONAL INFORMATION

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