NTMD4884NF

Power MOSFET and Schottky Diode

30 V, 5.7 A, Single N−Channel with 30 V, 2.8 A, Schottky Barrier Diode

Features

- FETKY™ Surface Mount Package Saves Board Space
- Independent Pin−Out for MOSFET and Schottky Allowing for Design Flexibility
- Low $R_{DS(on)}$ MOSFET and Low V_F Schottky to Minimize Conduction Losses
- Optimized Gate Charge to Minimize Switching Losses
- This is a Pb−Free Device

Applications

- Disk Drives
- DC−DC Converters
- Printers

MOSFET MAXIMUM RATINGS (T_J = 25°C unless otherwise stated)

Rating			Symbol	Value	Unit
Drain−to−Source Voltage			V_{DSS}	30	V
Gate−to−Source Voltage			V_{GS}	±20	V
Continuous Drain Current $R_{\theta JA}$ (Note 1)	Steady State	T_A = 25°C	I_D	4.7	A
		T_A = 70°C		3.8	
Power Dissipation $R_{\theta JA}$ (Note 1)		T_A = 25°C	P_D	1.6	W
Continuous Drain Current $R_{\theta JA}$ (Note 2)		T_A = 25°C	I_D	3.3	A
		T_A = 70°C		2.6	
Power Dissipation $R_{\theta JA}$ (Note 2)		T_A = 25°C	P_D	0.77	W
Continuous Drain Current $R_{\theta JA}$ t < 10 s (Note 1)		T_A = 25°C	I_D	5.7	A
		T_A = 70°C		4.5	
Power Dissipation $R_{\theta JA}$ t < 10 s (Note 1)		T_A = 25°C	P_D	2.3	W
Pulsed Drain Current	T_A = 25°C, t_p = 10 μs		I_{DM}	19	A
Operating Junction and Storage Temperature			T_J, T_{STG}	−55 to +150	°C
Source Current (Body Diode)			I_S	1.3	A
Lead Temperature for Soldering Purposes (1/8″ from case for 10 s)			T_L	260	°C

SCHOTTKY MAXIMUM RATINGS (T_J = 25°C unless otherwise stated)

Peak Repetitive Reverse Voltage		V_{RRM}	30	V
DC Blocking Voltage		V_R	30	V
Average Rectified Forward Current, (Note 1)	Steady State	I_F	2.8	A
	t < 10 s		4.1	

ON Semiconductor®

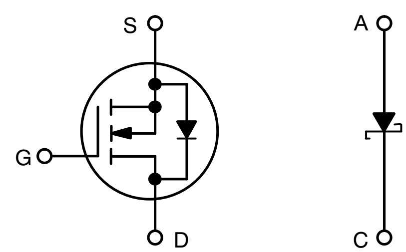
http://onsemi.com

N−CHANNEL MOSFET

$V_{(BR)DSS}$	$R_{DS(on)}$ Max	I_D Max
30 V	48 mΩ @ 10 V	5.7 A
	70 mΩ @ 4.5 V	

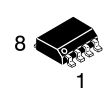
SCHOTTKY DIODE

V_R Max	V_F Max	I_F Max
30 V	0.5 V	2.8 A

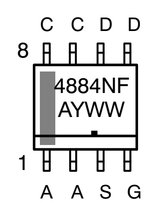


N−Channel MOSFET **Schottky Diode**

MARKING DIAGRAM & PIN ASSIGNMENT



SOIC−8
CASE 751
STYLE 18



4884NF = Device Code
A = Assembly Location
Y = Year
WW = Work Week
▪ = Pb−Free Package

ORDERING INFORMATION

Device	Package	Shipping†
NTMD4884NFR2G	SOIC−8 (Pb−Free)	2500/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.

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THERMAL RESISTANCE MAXIMUM RATINGS

Parameter MOSFET & Schottky	Symbol	Max	Unit
Junction–to–Ambient – Steady State (Note 1)	$R_{\theta JA}$	79	°C/W
Junction–to–Ambient – t ≤10 s Steady State (Note 1)	$R_{\theta JA}$	54	
Junction–to–FOOT (Drain) Equivalent to $R_{\theta JC}$	$R_{\theta JF}$	50	
Junction–to–Ambient – Steady State (Note 2)	$R_{\theta JA}$	163	

1. Surface–mounted on FR4 board using 1 inch sq pad size, 1 oz Cu.
2. Surface–mounted on FR4 board using the minimum recommended pad size.

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

Characteristic	Symbol	Test Condition		Min	Typ	Max	Unit
OFF CHARACTERISTICS							
Drain–to–Source Breakdown Voltage	$V_{(BR)DSS}$	V_{GS} = 0 V, I_D = 250 μA		30			V
Drain–to–Source Breakdown Voltage Temperature Coefficient	$V_{(BR)DSS}/T_J$				24		mV/°C
Zero Gate Voltage Drain Current	I_{DSS}	V_{GS} = 0 V, V_{DS} = 24 V	T_J = 25°C			1.0	μA
			T_J = 125°C			20	
Gate–to–Source Leakage Current	I_{GSS}	V_{DS} = 0 V, V_{GS} = ±20 V				±100	nA
ON CHARACTERISTICS (Note 3)							
Gate Threshold Voltage	$V_{GS(TH)}$	V_{GS} = V_{DS}, I_D = 250 μA		1.0		2.5	V
Negative Threshold Temperature Coefficient	$V_{GS(TH)}/T_J$				5.0		mV/°C
Drain–to–Source On Resistance	$R_{DS(on)}$	V_{GS} = 10 V	I_D = 4.0 A		34	48	mΩ
		V_{GS} = 4.5 V	I_D = 3.5 A		50	70	
Forward Transconductance	g_{FS}	V_{DS} = 5.0 V, I_D = 4.0 A			10		S
Gate Resistance	R_G				2.4	3.6	Ω
CHARGES, CAPACITANCES AND GATE RESISTANCE							
Input Capacitance	C_{ISS}	V_{GS} = 0 V, f = 1.0 MHz, V_{DS} = 15 V			280	360	pF
Output Capacitance	C_{OSS}				60	80	
Reverse Transfer Capacitance	C_{RSS}				32	42	
Total Gate Charge	$Q_{G(TOT)}$	V_{GS} = 4.5 V, V_{DS} = 15 V, I_D = 4.0 A			2.8	4.2	nC
Threshold Gate Charge	$Q_{G(TH)}$				0.4		
Gate–to–Source Charge	Q_{GS}				1.2		
Gate–to–Drain Charge	Q_{GD}				1.0		
Total Gate Charge	$Q_{G(TOT)}$	V_{GS} = 10 V, V_{DS} = 15 V, I_D = 4.0 A			5.6	8.0	nC
SWITCHING CHARACTERISTICS (Note 4)							
Turn–On Delay Time	$t_{d(ON)}$	V_{GS} = 10 V, V_{DS} = 15 V, I_D = 1.0 A, R_G = 6.0 Ω			6.0	12	ns
Rise Time	t_r				6.5	13	
Turn–Off Delay Time	$t_{d(OFF)}$				14	26	
Fall Time	t_f				1.4	7.0	
DRAIN–TO–SOURCE CHARACTERISTICS							
Forward Diode Voltage	V_{SD}	V_{GS} = 0 V, I_D = 1.3 A	T_J = 25°C		0.8	1.0	V
			T_J = 125°C		0.65		
Reverse Recovery Time	t_{RR}	V_{GS} = 0 V, d_{IS}/d_t = 100 A/μs, I_S = 4.0 A			9.2	20	ns
Charge Time	t_a				6.0		
Discharge Time	t_b				3.2		
Reverse Recovery Time	Q_{RR}				3.3		nC

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

Characteristic	Symbol	Test Condition	Min	Typ	Max	Unit

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

Parameter	Symbol	Test Conditions		Min	Typ	Max	Unit
Maximum Instantaneous Forward Voltage	V_F	I_F = 0.1 A	T_J = 25°C		0.26	0.28	V
			T_J = 125°C		0.11	0.13	
		I_F = 2.0 A	T_J = 25°C		0.4	0.50	
			T_J = 125°C		0.35	0.46	
Maximum Instantaneous Reverse Current	I_R	V_R = 10 V	T_J = 25°C		0.020	0.25	mA
			T_J = 125°C		10	37	

3. Pulse Test: pulse width ≤ 300 μs, duty cycle ≤ 2%.
4. Switching characteristics are independent of operating junction temperatures.

TYPICAL CHARACTERISTICS

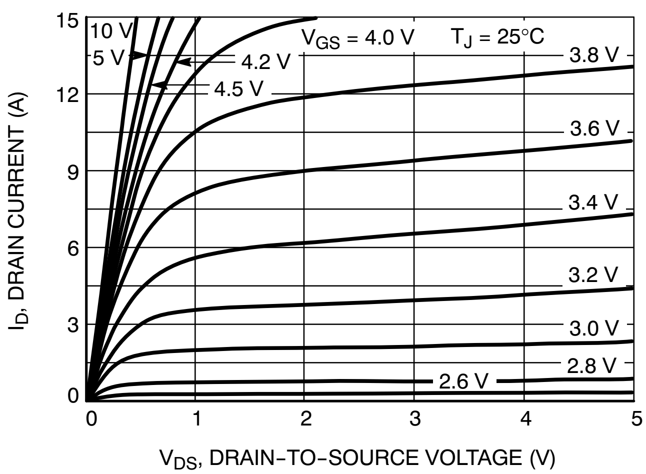

Figure 1. On−Region Characteristics

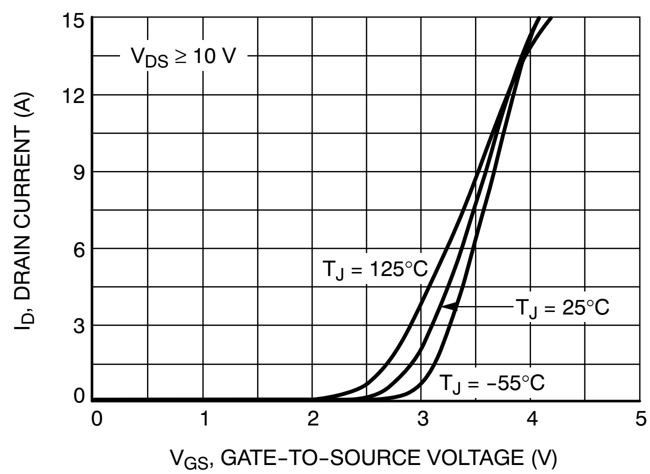

Figure 2. Transfer Characteristics

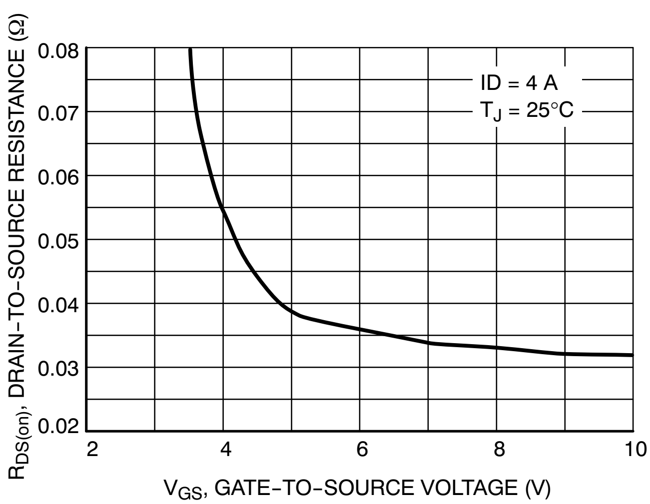

Figure 3. On−Resistance vs. Gate Voltage

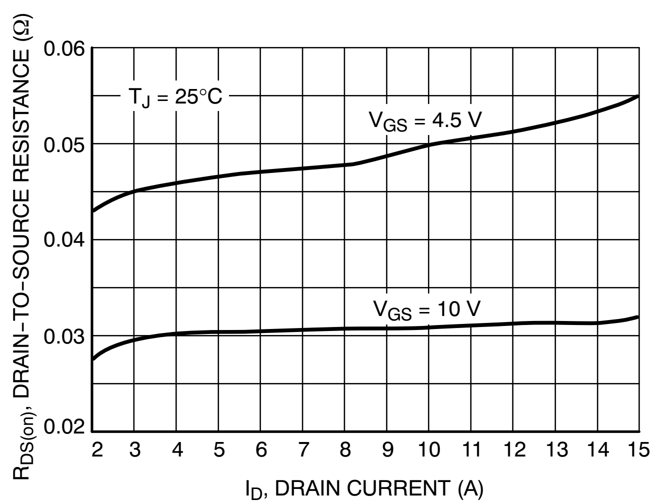

Figure 4. On−Resistance vs. Drain Current and Gate Voltage

TYPICAL CHARACTERISTICS

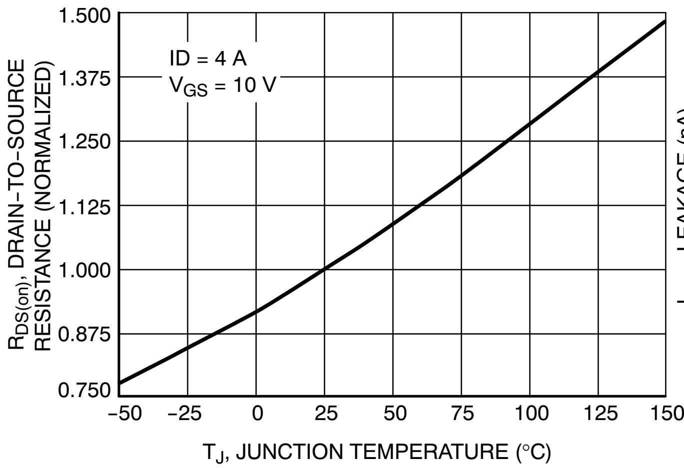

Figure 5. On−Resistance Variation with Temperature

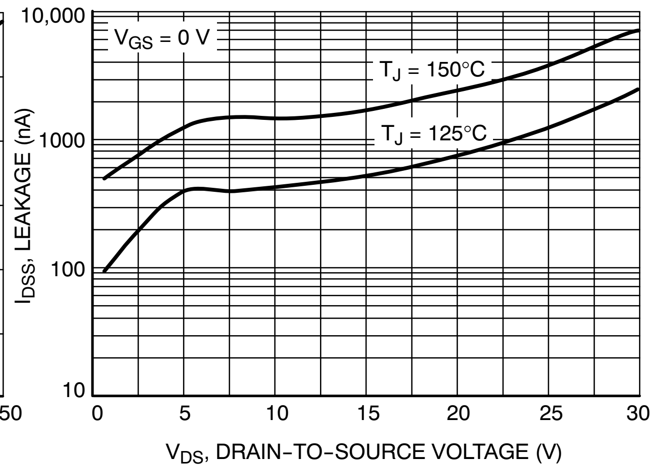

Figure 6. Drain−to−Source Leakage Current vs. Voltage

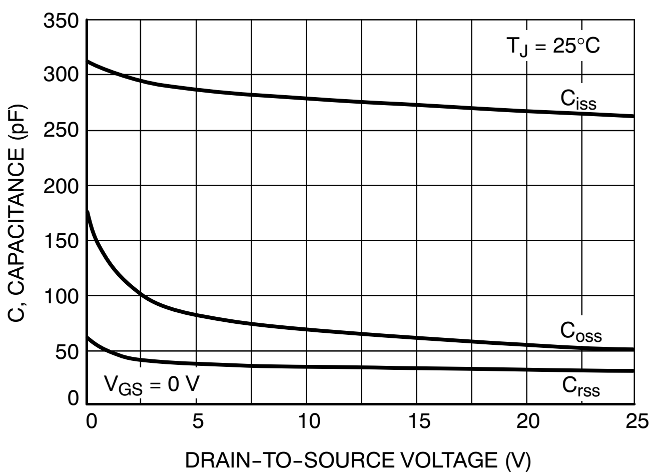

Figure 7. Capacitance Variation

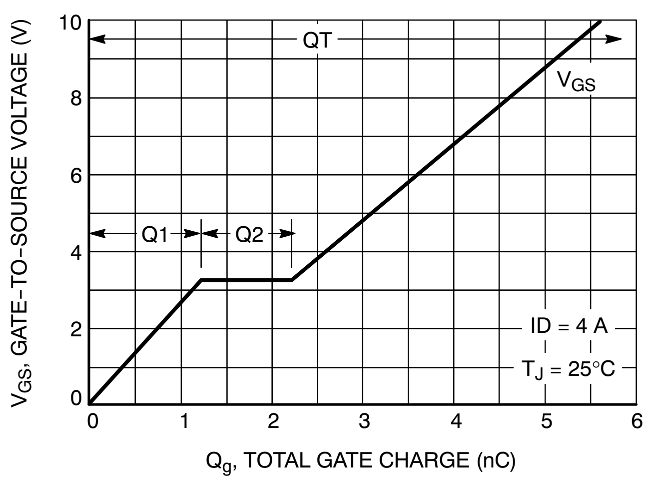

Figure 8. Gate−to−Source and Drain−to−Source Voltage vs. Total Charge

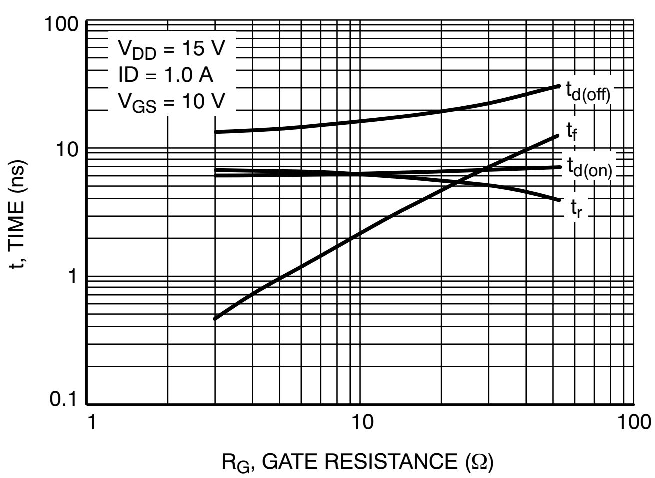

Figure 9. Resistive Switching Time Variation vs. Gate Resistance

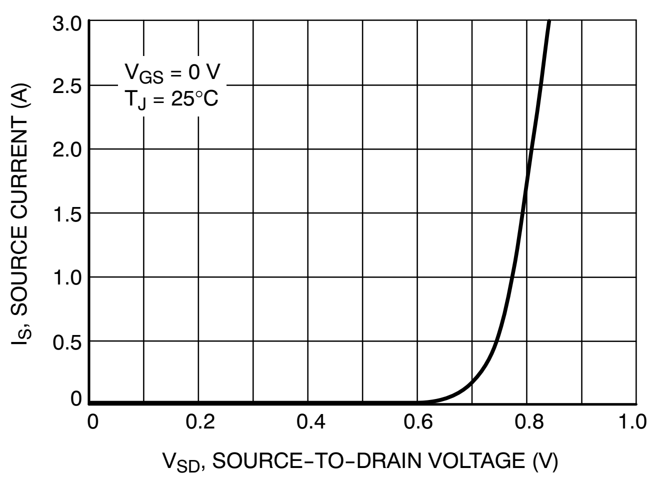

Figure 10. Diode Forward Voltage vs. Current

TYPICAL CHARACTERISTICS

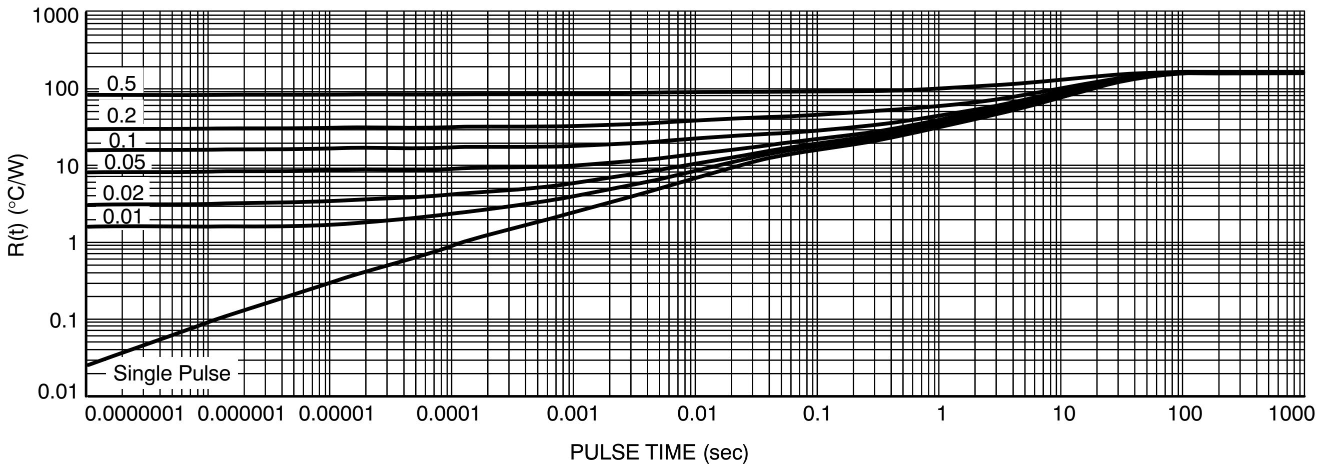

Figure 11. Thermal Response – $R_{\theta JA}$ at Steady State (min pad)

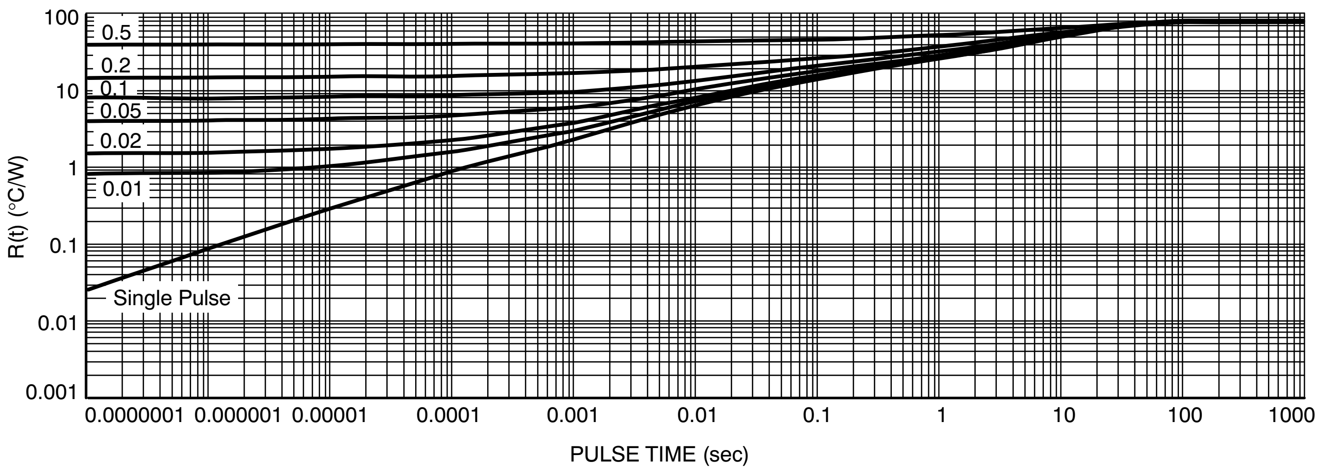

Figure 12. Thermal Response – $R_{\theta JA}$ at Steady State (1 inch sq pad)

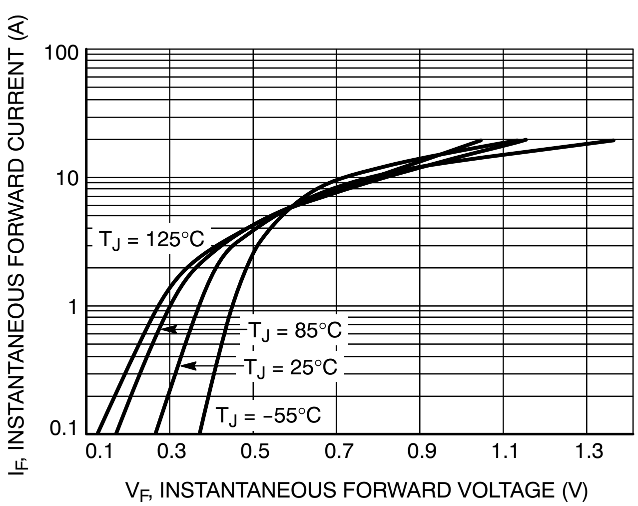

Figure 13. Typical Forward Voltage

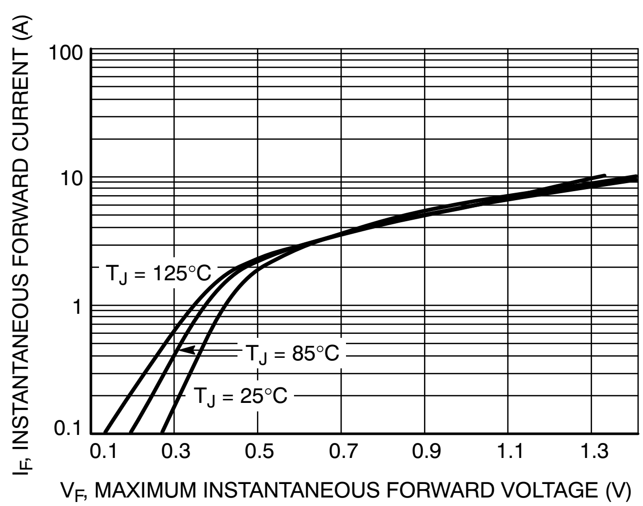

Figure 14. Maximum Forward Voltage

TYPICAL CHARACTERISTICS

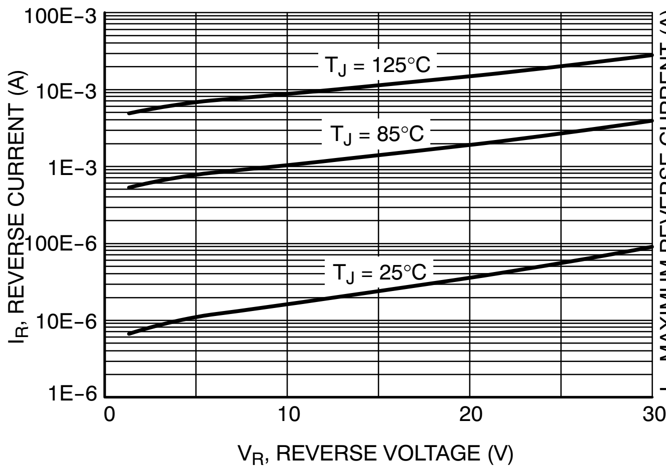

Figure 15. Typical Reverse Current

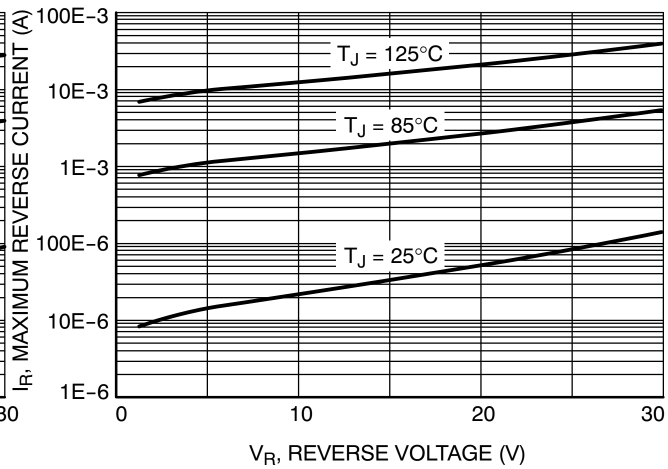

Figure 16. Maximum Reverse Current

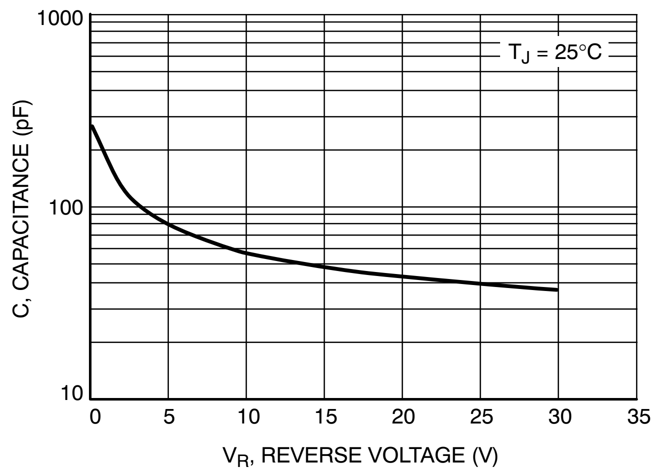

Figure 17. Capacitance

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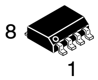
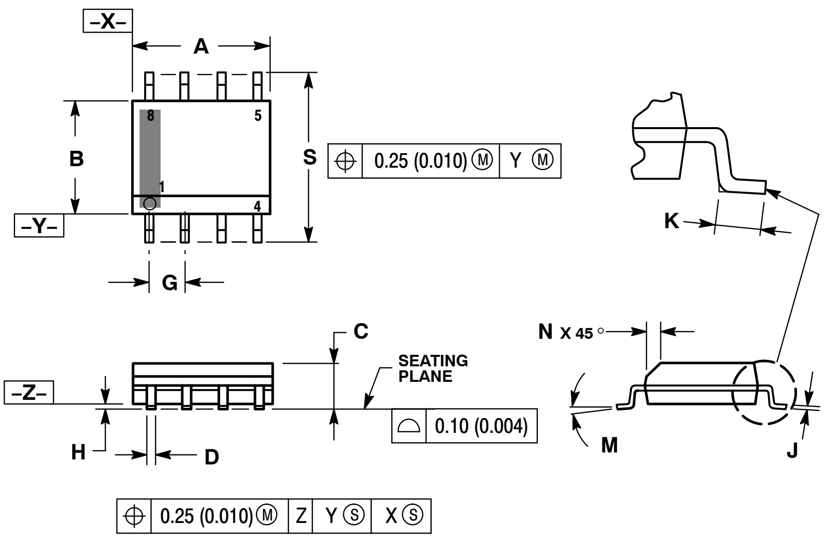


SCALE 1:1

SOIC−8 NB
CASE 751−07
ISSUE AK

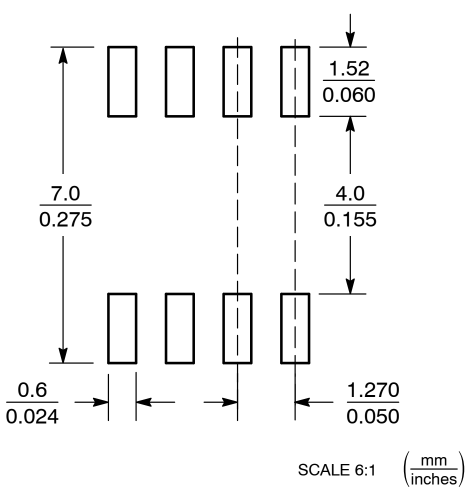
DATE 16 FEB 2011



NOTES:
1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: MILLIMETER.
3. DIMENSION A AND B DO NOT INCLUDE MOLD PROTRUSION.
4. MAXIMUM MOLD PROTRUSION 0.15 (0.006) PER SIDE.
5. DIMENSION D DOES NOT INCLUDE DAMBAR PROTRUSION. ALLOWABLE DAMBAR PROTRUSION SHALL BE 0.127 (0.005) TOTAL IN EXCESS OF THE D DIMENSION AT MAXIMUM MATERIAL CONDITION.
6. 751−01 THRU 751−06 ARE OBSOLETE. NEW STANDARD IS 751−07.

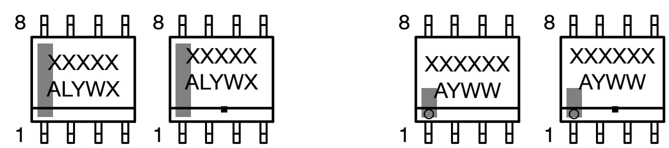
	MILLIMETERS		INCHES	
DIM	MIN	MAX	MIN	MAX
A	4.80	5.00	0.189	0.197
B	3.80	4.00	0.150	0.157
C	1.35	1.75	0.053	0.069
D	0.33	0.51	0.013	0.020
G	1.27 BSC		0.050 BSC	
H	0.10	0.25	0.004	0.010
J	0.19	0.25	0.007	0.010
K	0.40	1.27	0.016	0.050
M	0 °	8 °	0 °	8 °
N	0.25	0.50	0.010	0.020
S	5.80	6.20	0.228	0.244

SOLDERING 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.

GENERIC MARKING DIAGRAM*



IC **IC (Pb−Free)** **Discrete** **Discrete (Pb−Free)**

XXXXX = Specific Device Code
A = Assembly Location
L = Wafer Lot
Y = Year
W = Work Week
▪ = Pb−Free Package

XXXXXX = Specific Device Code
A = Assembly Location
Y = Year
WW = Work Week
▪ = 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.

STYLES ON PAGE 2

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CASE 751−07
ISSUE AK

DATE 16 FEB 2011

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

STYLE 2:
PIN 1. COLLECTOR, DIE, #1
2. COLLECTOR, #1
3. COLLECTOR, #2
4. COLLECTOR, #2
5. BASE, #2
6. EMITTER, #2
7. BASE, #1
8. EMITTER, #1

STYLE 3:
PIN 1. DRAIN, DIE #1
2. DRAIN, #1
3. DRAIN, #2
4. DRAIN, #2
5. GATE, #2
6. SOURCE, #2
7. GATE, #1
8. SOURCE, #1

STYLE 4:
PIN 1. ANODE
2. ANODE
3. ANODE
4. ANODE
5. ANODE
6. ANODE
7. ANODE
8. COMMON CATHODE

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

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

STYLE 7:
PIN 1. INPUT
2. EXTERNAL BYPASS
3. THIRD STAGE SOURCE
4. GROUND
5. DRAIN
6. GATE 3
7. SECOND STAGE Vd
8. FIRST STAGE Vd

STYLE 8:
PIN 1. COLLECTOR, DIE #1
2. BASE, #1
3. BASE, #2
4. COLLECTOR, #2
5. COLLECTOR, #2
6. EMITTER, #2
7. EMITTER, #1
8. COLLECTOR, #1

STYLE 9:
PIN 1. EMITTER, COMMON
2. COLLECTOR, DIE #1
3. COLLECTOR, DIE #2
4. EMITTER, COMMON
5. EMITTER, COMMON
6. BASE, DIE #2
7. BASE, DIE #1
8. EMITTER, COMMON

STYLE 10:
PIN 1. GROUND
2. BIAS 1
3. OUTPUT
4. GROUND
5. GROUND
6. BIAS 2
7. INPUT
8. GROUND

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

STYLE 12:
PIN 1. SOURCE
2. SOURCE
3. SOURCE
4. GATE
5. DRAIN
6. DRAIN
7. DRAIN
8. DRAIN

STYLE 13:
PIN 1. N.C.
2. SOURCE
3. SOURCE
4. GATE
5. DRAIN
6. DRAIN
7. DRAIN
8. DRAIN

STYLE 14:
PIN 1. N−SOURCE
2. N−GATE
3. P−SOURCE
4. P−GATE
5. P−DRAIN
6. P−DRAIN
7. N−DRAIN
8. N−DRAIN

STYLE 15:
PIN 1. ANODE 1
2. ANODE 1
3. ANODE 1
4. ANODE 1
5. CATHODE, COMMON
6. CATHODE, COMMON
7. CATHODE, COMMON
8. CATHODE, COMMON

STYLE 16:
PIN 1. EMITTER, DIE #1
2. BASE, DIE #1
3. EMITTER, DIE #2
4. BASE, DIE #2
5. COLLECTOR, DIE #2
6. COLLECTOR, DIE #2
7. COLLECTOR, DIE #1
8. COLLECTOR, DIE #1

STYLE 17:
PIN 1. VCC
2. V2OUT
3. V1OUT
4. TXE
5. RXE
6. VEE
7. GND
8. ACC

STYLE 18:
PIN 1. ANODE
2. ANODE
3. SOURCE
4. GATE
5. DRAIN
6. DRAIN
7. CATHODE
8. CATHODE

STYLE 19:
PIN 1. SOURCE 1
2. GATE 1
3. SOURCE 2
4. GATE 2
5. DRAIN 2
6. MIRROR 2
7. DRAIN 1
8. MIRROR 1

STYLE 20:
PIN 1. SOURCE (N)
2. GATE (N)
3. SOURCE (P)
4. GATE (P)
5. DRAIN
6. DRAIN
7. DRAIN
8. DRAIN

STYLE 21:
PIN 1. CATHODE 1
2. CATHODE 2
3. CATHODE 3
4. CATHODE 4
5. CATHODE 5
6. COMMON ANODE
7. COMMON ANODE
8. CATHODE 6

STYLE 22:
PIN 1. I/O LINE 1
2. COMMON CATHODE/VCC
3. COMMON CATHODE/VCC
4. I/O LINE 3
5. COMMON ANODE/GND
6. I/O LINE 4
7. I/O LINE 5
8. COMMON ANODE/GND

STYLE 23:
PIN 1. LINE 1 IN
2. COMMON ANODE/GND
3. COMMON ANODE/GND
4. LINE 2 IN
5. LINE 2 OUT
6. COMMON ANODE/GND
7. COMMON ANODE/GND
8. LINE 1 OUT

STYLE 24:
PIN 1. BASE
2. EMITTER
3. COLLECTOR/ANODE
4. COLLECTOR/ANODE
5. CATHODE
6. CATHODE
7. COLLECTOR/ANODE
8. COLLECTOR/ANODE

STYLE 25:
PIN 1. VIN
2. N/C
3. REXT
4. GND
5. IOUT
6. IOUT
7. IOUT
8. IOUT

STYLE 26:
PIN 1. GND
2. dv/dt
3. ENABLE
4. ILIMIT
5. SOURCE
6. SOURCE
7. SOURCE
8. VCC

STYLE 27:
PIN 1. ILIMIT
2. OVLO
3. UVLO
4. INPUT+
5. SOURCE
6. SOURCE
7. SOURCE
8. DRAIN

STYLE 28:
PIN 1. SW_TO_GND
2. DASIC_OFF
3. DASIC_SW_DET
4. GND
5. V_MON
6. VBULK
7. VBULK
8. VIN

STYLE 29:
PIN 1. BASE, DIE #1
2. EMITTER, #1
3. BASE, #2
4. EMITTER, #2
5. COLLECTOR, #2
6. COLLECTOR, #2
7. COLLECTOR, #1
8. COLLECTOR, #1

STYLE 30:
PIN 1. DRAIN 1
2. DRAIN 1
3. GATE 2
4. SOURCE 2
5. SOURCE 1/DRAIN 2
6. SOURCE 1/DRAIN 2
7. SOURCE 1/DRAIN 2
8. GATE 1

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