Power MOSFET

40 V, 3.8 m Ω , 85 A, Single N-Channel

Features

- Small Footprint (3.3 x 3.3 mm) for Compact Design
- Low R_{DS(on)} to Minimize Conduction Losses
- Low Q_G and Capacitance to Minimize Driver Losses
- These Devices are Pb–Free, Halogen Free/BFR Free and are RoHS Compliant

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

Parar	Symbol	Value	Unit		
Drain-to-Source Voltag	V_{DSS}	40	V		
Gate-to-Source Voltage	Э		V_{GS}	±20	V
Continuous Drain		T _C = 25°C	I _D	85	Α
Current R _{θJC} (Notes 1, 3)	Steady	T _C = 100°C		60	
Power Dissipation	State	T _C = 25°C	P _D	55	W
R _{θJC} (Note 1)		T _C = 100°C		27	
Continuous Drain		T _A = 25°C	I _D	20	Α
Current R _{0JA} (Notes 1, 2, 3)	Steady	T _A = 100°C		14	
Power Dissipation	State	T _A = 25°C	P_{D}	3.2	W
R _{θJA} (Notes 1 & 2)		T _A = 100°C		1.6	
Pulsed Drain Current $T_A = 25^{\circ}C$, $t_p = 10 \mu s$			I _{DM}	520	Α
Operating Junction and Storage Temperature			T _J , T _{stg}	-55 to +175	°C
Source Current (Body Diode)			I _S	61	Α
Single Pulse Drain-to-Source Avalanche Energy (I _{L(pk)} = 5 A)			E _{AS}	202	mJ
Lead Temperature for Soldering Purposes (1/8" from case for 10 s)			TL	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 MAXIMUM RATINGS

Parameter	Symbol	Value	Unit
Junction-to-Case - Steady State	$R_{ heta JC}$	2.7	°C/W
Junction-to-Ambient - Steady State (Note 2)	$R_{\theta JA}$	47	

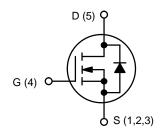
- The entire application environment impacts the thermal resistance values shown, they are not constants and are only valid for the particular conditions noted.
- 2. Surface-mounted on FR4 board using a 650 mm², 2 oz. Cu pad.
- 3. Maximum current for pulses as long as 1 second is higher but is dependent on pulse duration and duty cycle.



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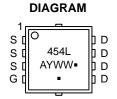
V _{(BR)DSS}	R _{DS(ON)} MAX	I _D MAX
40 V	$3.8~\text{m}\Omega$ @ $10~\text{V}$	0F A
40 V	6 mΩ @ 4.5 V	85 A



N-CHANNEL MOSFET



WDFN8 (μ8FL) CASE 511AB



MARKING

454L = Specific Device Code A = Assembly Location

Y = Year WW = Work Week ■ Pb-Free Package

(Note: Microdot may be in either location)

ORDERING INFORMATION

See detailed ordering, marking and shipping information on page 5 of this data sheet.

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

Parameter	Symbol	Test Condition		Min	Тур	Max	Unit
OFF CHARACTERISTICS							
Drain-to-Source Breakdown Voltage	V _{(BR)DSS}	V _{GS} = 0 V, I _D = 250 μA		40			V
Drain-to-Source Breakdown Voltage Temperature Coefficient	V _{(BR)DSS} /				22		mV/°C
Zero Gate Voltage Drain Current	I _{DSS}	$V_{GS} = 0 V$	T _J = 25 °C			10	
		$V_{DS} = 40 \text{ V}$	T _J = 125°C			250	μΑ
Gate-to-Source Leakage Current	I _{GSS}	V _{DS} = 0 V, V _{GS}	_S = 20 V			100	nA
ON CHARACTERISTICS (Note 4)					•	•	
Gate Threshold Voltage	V _{GS(TH)}	$V_{GS} = V_{DS}, I_D$	= 250 μΑ	1.2		2.0	V
Threshold Temperature Coefficient	V _{GS(TH)} /T _J				-5.1		mV/°C
Drain-to-Source On Resistance	R _{DS(on)}	V _{GS} = 10 V	I _D = 20 A		3.2	3.8	
		V _{GS} = 4.5 V	I _D = 20 A		4.8	6	mΩ
Forward Transconductance	9FS	V _{DS} = 15 V, I _D) = 40 A		80		S
CHARGES AND CAPACITANCES	•					•	•
Input Capacitance	C _{ISS}				1600		pF
Output Capacitance	C _{OSS}	V _{GS} = 0 V, f = 1 MH	z, V _{DS} = 25 V		590		
Reverse Transfer Capacitance	C _{RSS}	30 / 20			21		1
Total Gate Charge	Q _{G(TOT)}	V _{GS} = 10 V, V _{DS} = 20 V; I _D = 40 A			18		
Total Gate Charge	Q _{G(TOT)}				8.2		nC
Threshold Gate Charge	Q _{G(TH)}				2		
Gate-to-Source Charge	Q _{GS}	$V_{GS} = 4.5 \text{ V}, V_{DS} = 2$	20 V; I _D = 40 A		3.8		
Gate-to-Drain Charge	Q_{GD}				2.1		
Plateau Voltage	V_{GP}				3.2		V
SWITCHING CHARACTERISTICS (Note 5)				I	ı	1
Turn-On Delay Time	t _{d(ON)}				9.3		
Rise Time	t _r	Vcs = 4.5 V. Vn	se = 20 V.		100		1
Turn-Off Delay Time	t _{d(OFF)}	$V_{GS} = 4.5 \text{ V}, V_{DS} = 20 \text{ V},$ $I_{D} = 40 \text{ A}, R_{G} = 2.5 \Omega$			17		ns
Fall Time	t _f				4		
DRAIN-SOURCE DIODE CHARACTERIS	TICS				1	1	
Forward Diode Voltage	V_{SD}	V _{GS} = 0 V,	T _J = 25°C		0.86	1.2	
		$I_S = 40 \text{ A}$	T _J = 125°C		0.75		V
Reverse Recovery Time	t _{RR}	$V_{GS} = 0 \text{ V, } dI_{S}/dt = 100 \text{ A/}\mu\text{s,}$ $I_{S} = 40 \text{ A}$			29		
Charge Time	t _a				14		ns
Discharge Time	t _b				15		
Reverse Recovery Charge	Q _{RR}				20		nC

Product parametric performance is indicated in the Electrical Characteristics for the listed test conditions, unless otherwise noted. Product performance may not be indicated by the Electrical Characteristics if operated under different conditions.

4. Pulse Test: pulse width $\leq 300~\mu s$, duty cycle $\leq 2\%$.

5. Switching characteristics are independent of operating junction temperatures.

TYPICAL CHARACTERISTICS

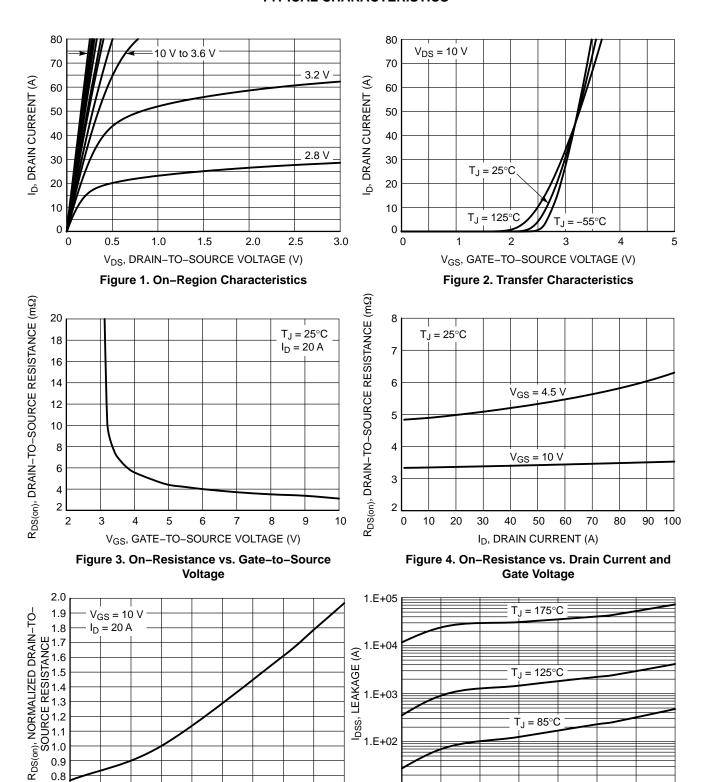


Figure 5. On–Resistance Variation with Temperature

TJ, JUNCTION TEMPERATURE (°C)

75

100

150

175

50

0.7

-50

-25

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

V_{DS}, DRAIN-TO-SOURCE VOLTAGE (V)

35

40

20

15

1.E+01

TYPICAL CHARACTERISTICS

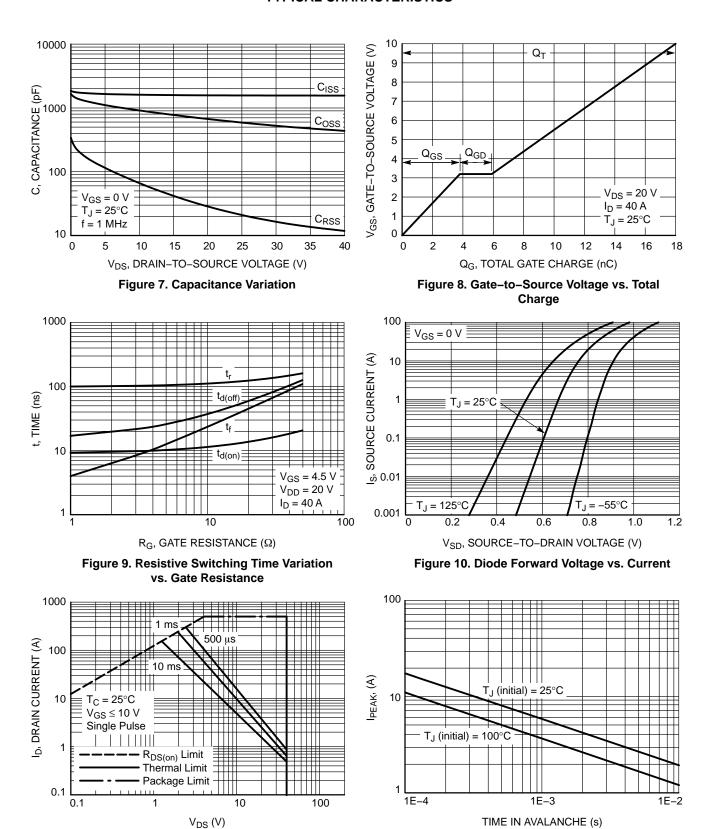


Figure 12. I_{PEAK} vs. Time in Avalanche

Figure 11. Safe Operating Area

TYPICAL CHARACTERISTICS

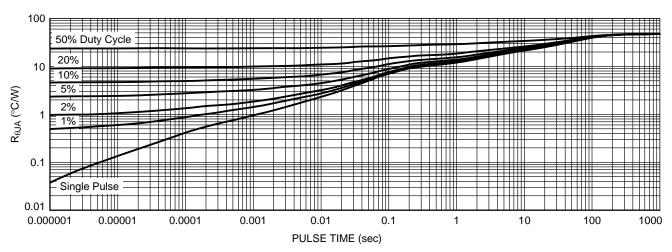


Figure 13. Thermal Characteristics

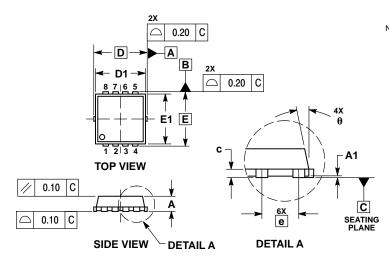
DEVICE ORDERING INFORMATION

Device	Marking	Package	Shipping [†]
NTTFS5C454NLTAG	454L	WDFN8 (Pb–Free)	1500 / Tape & Reel
NTTFS5C454NLTWG	454L	WDFN8 (Pb-Free)	5000 / 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.

PACKAGE DIMENSIONS

WDFN8 3.3x3.3, 0.65P CASE 511AB ISSUE D



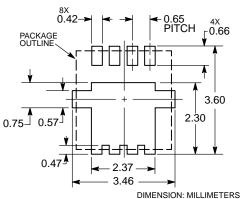
NOTES

- DIMENSIONING AND TOLERANCING PER ASME Y14.5M, 1994.
 CONTROLLING DIMENSION: MILLIMETERS.
- DIMENSION D1 AND E1 DO NOT INCLUDE MOLD FLASH PROTRUSIONS OR GATE BURRS.

	MI	MILLIMETERS			INCHES			
DIM	MIN	NOM	MAX	MIN	NOM	MAX		
Α	0.70	0.75	0.80	0.028	0.030	0.031		
A1	0.00		0.05	0.000		0.002		
b	0.23	0.30	0.40	0.009	0.012	0.016		
С	0.15	0.20	0.25	0.006	0.008	0.010		
D		3.30 BSC		0.130 BSC				
D1	2.95	3.05	3.15	0.116	0.120	0.124		
D2	1.98	2.11	2.24	0.078	0.083	0.088		
E	3.30 BSC			0.130 BSC				
E1	2.95	3.05	3.15	0.116	0.120	0.124		
E2	1.47	1.60	1.73	0.058	0.063	0.068		
E3	0.23	0.30	0.40	0.009	0.012	0.016		
е	0.65 BSC			0.026 BSC				
G	0.30	0.41	0.51	0.012	0.016	0.020		
K	0.65	0.80	0.95	0.026	0.032	0.037		
L	0.30	0.43	0.56	0.012	0.017	0.022		
L1	0.06	0.13	0.20	0.002	0.005	0.008		
M	1.40	1.50	1.60	0.055	0.059	0.063		
θ	0 °		12 °	0 °		12 °		

С В 0.10 Α 0.05 С **E**3 D2 **BOTTOM VIEW**

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.

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