

DESCRIPTION

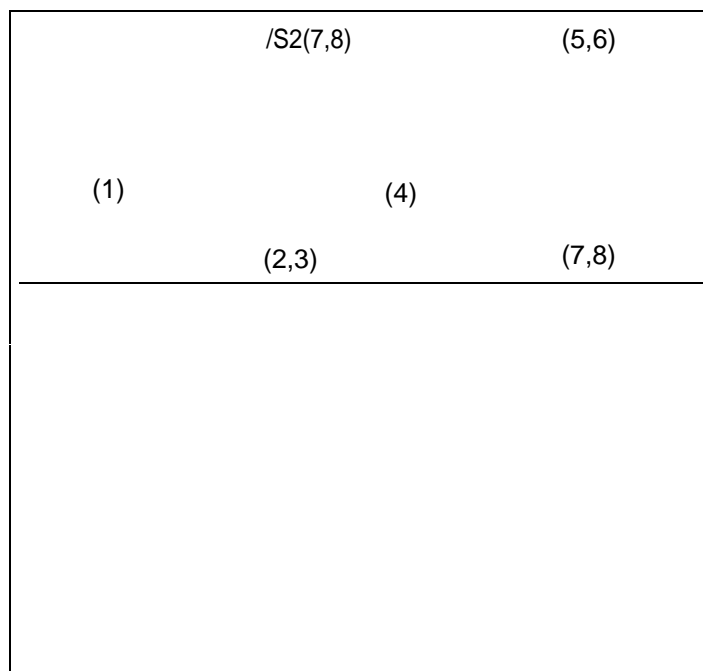
The 4504 uses advanced trench technology to provide excellent RDS(ON) and low gate charge. This device is suitable for use as a load switch or in PWM applications.

GENERAL FEATURES

- RDS(ON) <22mΩ @ VGS=4.5V
RDS(ON) <15mΩ @ VGS=10V
- High Power and current handing capability
- Lead free product is acquired
- Surface Mount Package

Application

- PWM applications
- Load switch
- Power management



ABSOLUTE MAXIMUM RATINGS(T_A=25°C unless otherwise noted)

Parameter	Symbol	Limit	Unit
Drain-Source Voltage	V _{DS}	45	V
Gate-Source Voltage	V _{GS}	±20	V
Drain Current @ Continuous(Note 2)	I _D (25°C)	30	A
	I _D (100°C)	20	A
Drain Current @ Current-Pulsed (Note 1)	I _{DM}	112	A
Maximum Power Dissipation (T _A =25°C)	P _D	35	W
Operating Junction and Storage Temperature Range	T _J ,T _{STG}	-55 To 150	°C

THERMAL CHARACTERISTICS

Thermal Resistance,Junction-to-Ambient (Note 2)	R _{θJA}	35	°C/W
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ELECTRICAL CHARACTERISTICS ($T_A=25^{\circ}\text{C}$ unless otherwise noted)

Parameter	Symbol	Condition	Min	Typ	Max	Unit
OFF CHARACTERISTICS						
Drain-Source Breakdown Voltage	BV_{DSS}	$V_{GS}=0V, I_D=250\mu A$	45			V
Zero Gate Voltage Drain Current	I_{DSS}	$V_{DS}=24V, V_{GS}=0V$			1	μA
Gate-Body Leakage Current	I_{GSS}	$V_{GS}=\pm 20V, V_{DS}=0V$			± 100	nA
ON CHARACTERISTICS (Note 3)						
Gate Threshold Voltage	$V_{GS(th)}$	$V_{DS}=V_{GS}, I_D=250\mu A$	1		2	V
Drain-Source On-State Resistance	$R_{DS(on)}$	$V_{GS}=4.5V, I_D=15A$		16	22	m Ω
		$V_{GS}=10V, I_D=15A$		12	15	m Ω
DYNAMIC CHARACTERISTICS (Note 4)						
Input Capacitance	C_{iss}	$V_{DS}=15V, V_{GS}=0V, F=1.0MHz$		930	1350	PF
Output Capacitance	C_{oss}			135	190	PF
Reverse Transfer Capacitance	C_{rss}			110	160	PF
SWITCHING CHARACTERISTICS (Note 4)						
Turn-on Delay Time	$t_{d(on)}$	$V_{DS}=15V, V_{GS}=10V, R_{GEN}=3.3\Omega$ $I_{DS}=15A$		4.5		nS
Turn-on Rise Time	t_r			9		nS
Turn-Off Delay Time	$t_{d(off)}$			32		nS
Turn-Off Fall Time	t_f			5		nS
Total Gate Charge	Q_g	$V_{DS}=15V, I_D=15A, V_{GS}=4.5V$		15		nC
Gate-Source Charge	Q_{gs}			4.5		nC
Gate-Drain Charge	Q_{gd}			7		nC
Body Diode Reverse Recovery Time	T_{rr}	$I_F=5A, di/dt=100A/\mu s$		20		nS
Body Diode Reverse Recovery Charge	Q_{rr}			10		nC
DRAIN-SOURCE DIODE CHARACTERISTICS						
Diode Forward Voltage (Note 3)	V_{SD}	$V_{GS}=0V, I_S=1A$		0.80	1.2	V

NOTES:

1. Pulse Test: Pulse Width $\leq 300\mu s$, Duty Cycle $\leq 2\%$.
2. $R_{\theta JA}$ is the sum of the junction-to-case and case-to-ambient thermal resistance where the case thermal reference is defined as the solder mounting surface of the drain pins. $R_{\theta JC}$ is guaranteed by design while $R_{\theta CA}$ is determined by the user's board design. $R_{\theta JA}$ shown below for single device operation on FR-4 in still air.

TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

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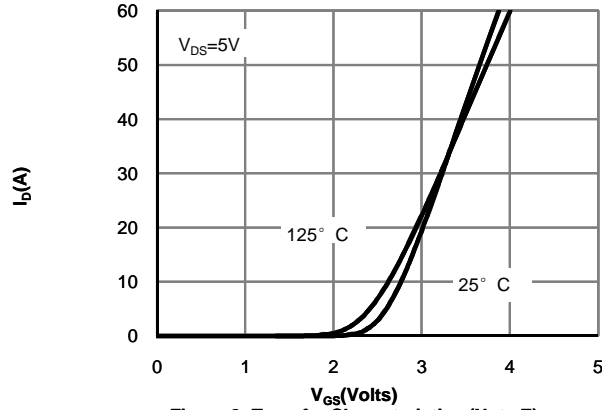


Figure 2: Transfer Characteristics (Note E)

Fig.1 Typical Output Characteristics

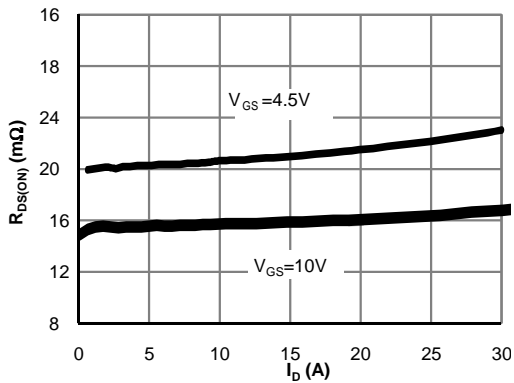


Figure 3: On-Resistance vs. Drain Current and Gate Voltage (Note E)

Fig.2 On Resistance vs. GS Voltage

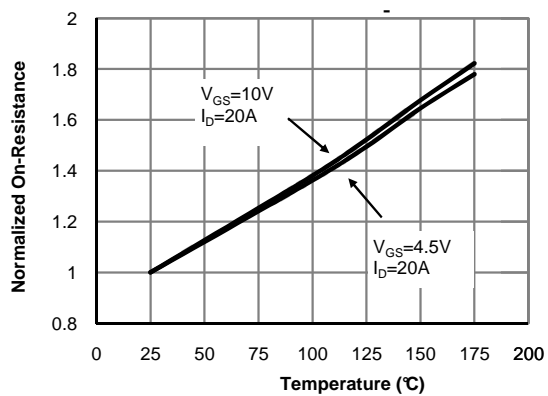


Figure 4: On-Resistance vs. Junction Temperature (Note E)

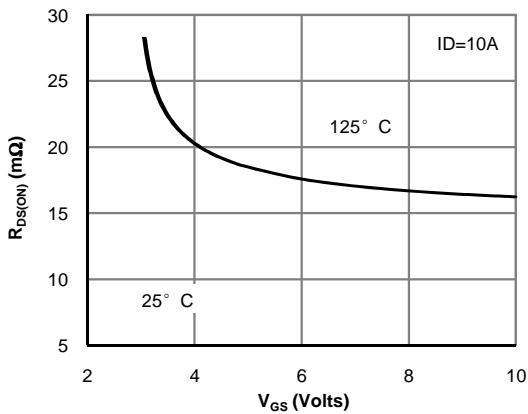


Figure 5: On-Resistance vs. Gate-Source Voltage (Note E)

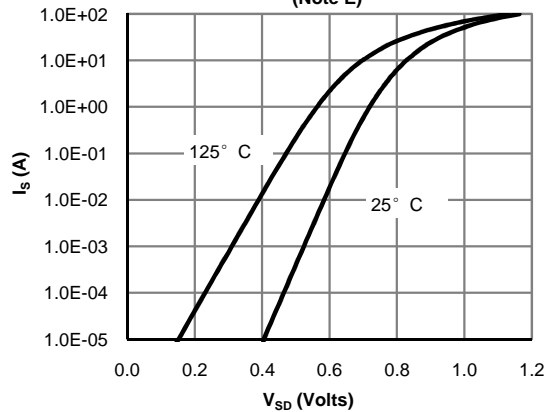


Figure 6: Body-Diode Characteristics (Note E)

TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

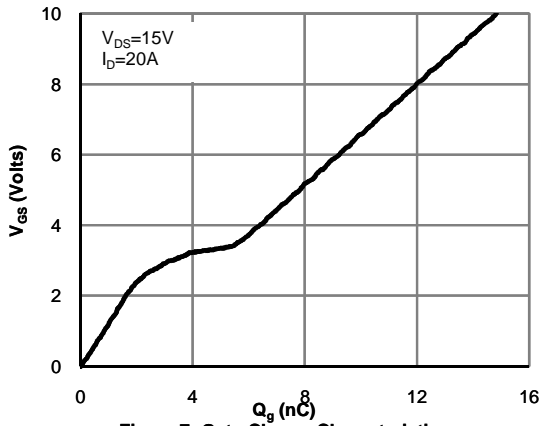


Figure 7: Gate-Charge Characteristics

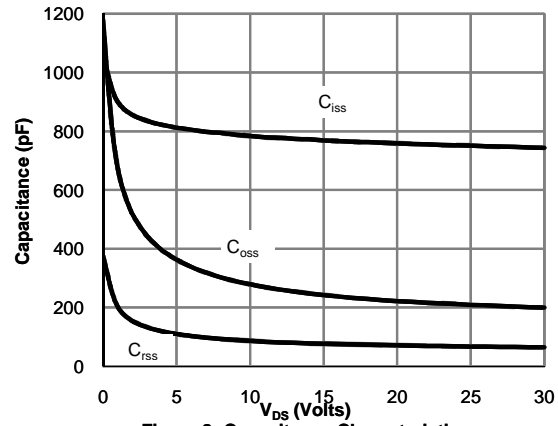


Figure 8: Capacitance Characteristics

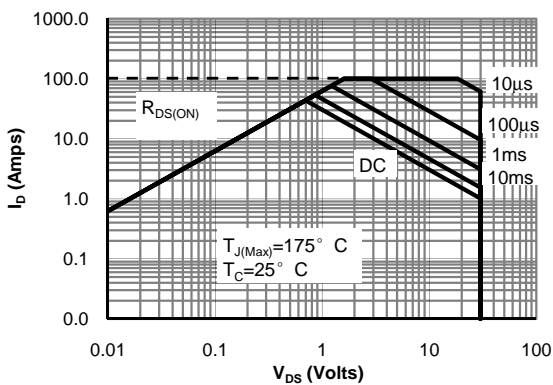


Figure 9: Maximum Forward Biased Safe Operating Area (Note F)

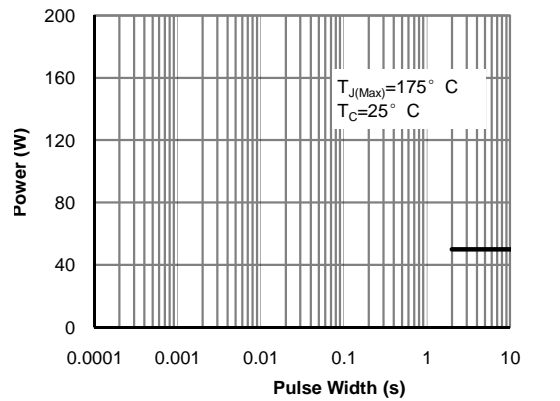


Figure 10: Single Pulse Power Rating

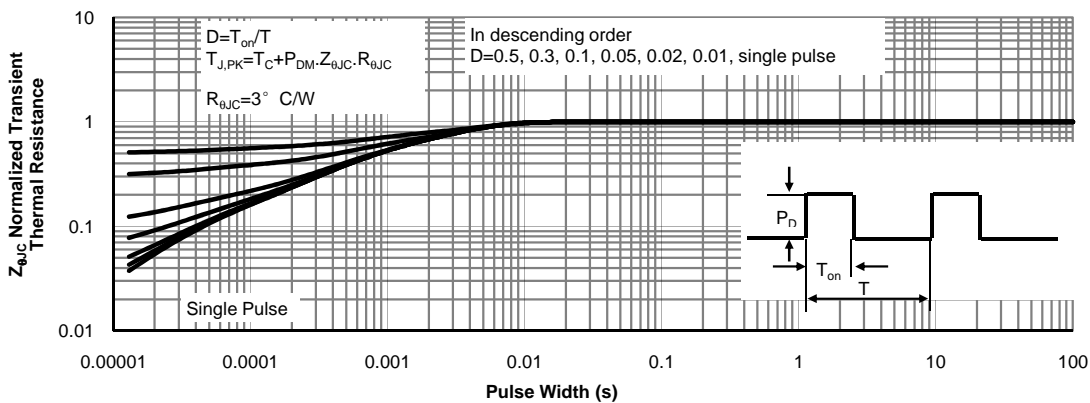


Figure 11: Normalized Maximum Transient Thermal Impedance (Note F)

TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

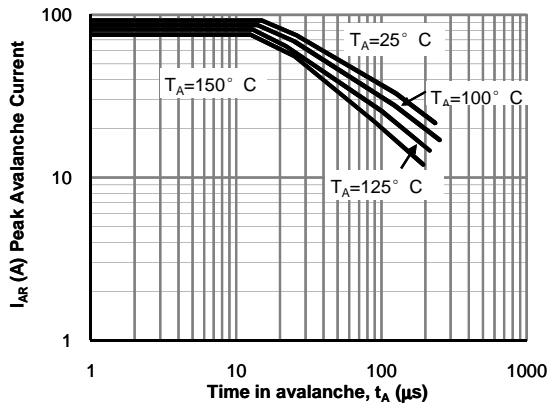


Figure 12: Single Pulse Avalanche capability (Note C)

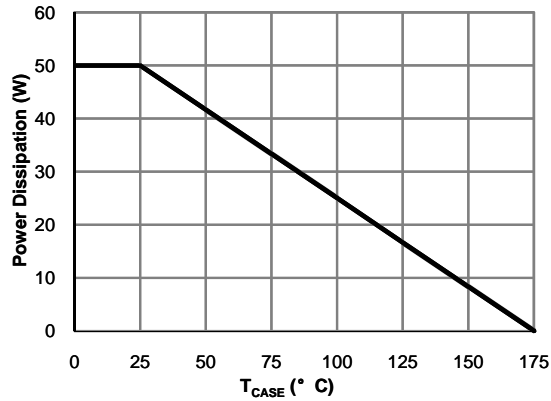


Figure 13: Power De-rating (Note F)

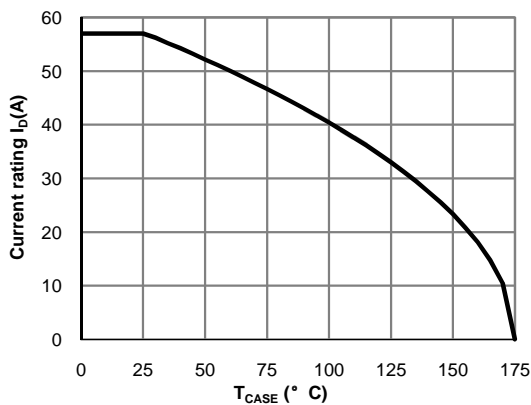


Figure 14: Current De-rating (Note F)

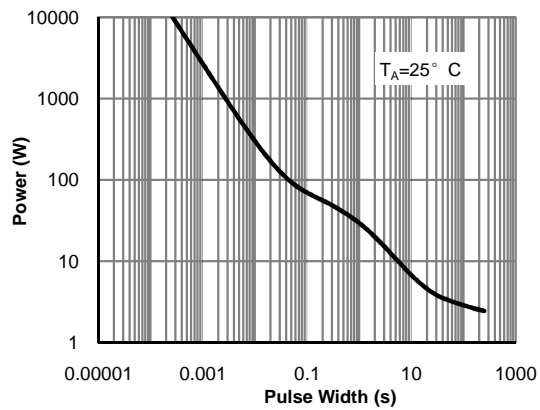


Figure 15: Single Pulse Power Rating Junction-to-Ambient (Note H)

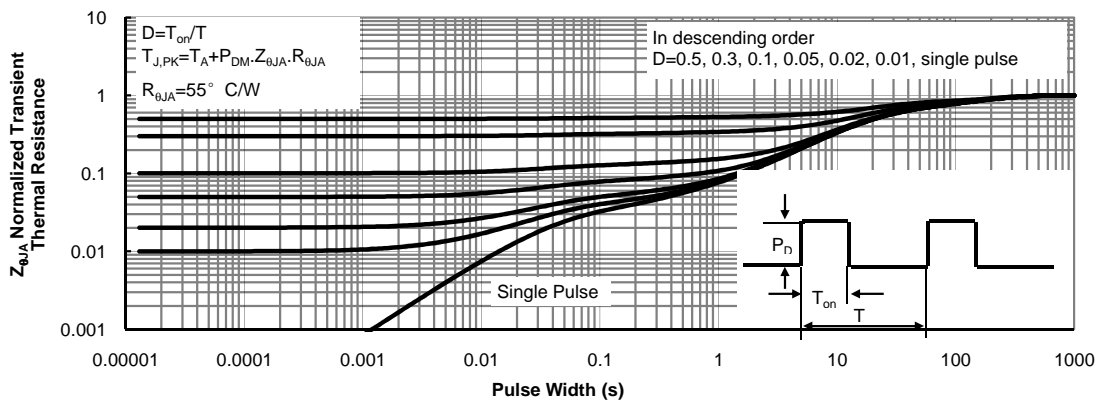


Figure 16: Normalized Maximum Transient Thermal Impedance (Note H)

Package Information

DFN5*6-8 Package