



## DESCRIPTION

AM6594 is the N-Channel enhancement mode power field effect transistors are using trench DMOS technology. This advanced technology has been especially tailored to minimize on-state resistance, provide superior, fast switching performance, and withstand high energy pulse in the avalanche and commutation mode. These devices are well suited for high efficiency fast switching applications.

AM6594 is available in a DFN8(5x6) package.

## ORDERING INFORMATION

Package Type	Part Number	
DFN8 SPQ: 2,500pcs/Reel	J8	AM6594J8R
		AM6594J8VR
Note	V: Halogen free Package R: Tape & Reel	
AiT provides all RoHS products		

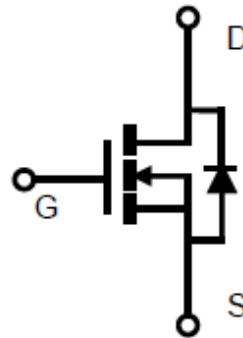
## FEATURES

- $V_{DS} = 30V$ ,  $I_D = 50A$   
 $R_{DS(ON)}=4.5m\Omega(Typ.)@V_{GS}=10V$   
 $R_{DS(ON)}=5.6m\Omega(Typ.)@V_{GS}=4.5V$
- Low Gate Charge
- 100% UIS and  $R_g$  tested
- High power and current handling capability
- Available in a DFN8(5x6) package.

## APPLICATION

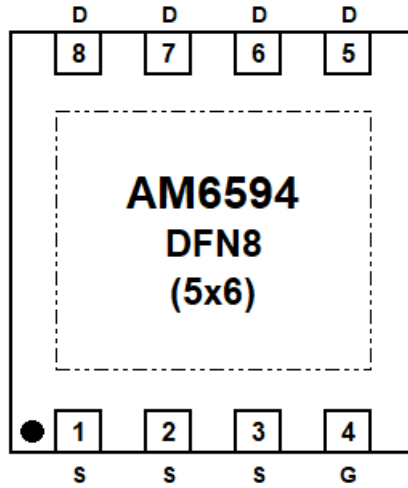
- Wireless Charging
- DC/DC Converters
- Load Switch

## PIN DESCRIPTION





## PIN DESCRIPTION



Top View

Pin #	Symbol	Function
1	S	Source
2	S	Source
3	S	Source
4	G	Gate
5	D	Drain
6	D	Drain
7	D	Drain
8	D	Drain



## ABSOLUTE MAXIMUM RATINGS

T<sub>A</sub> = 25°C, unless otherwise noted

V <sub>DSS</sub> , Drain-Source Voltage		30V
V <sub>GSS</sub> , Gate-Source Voltage		±20V
I <sub>D</sub> , Continuous Drain Current	T <sub>C</sub> =25°C	50A
	T <sub>C</sub> =100°C	39.1A
I <sub>DM</sub> , Pulsed Drain Current <sup>NOTE1</sup>		124A
I <sub>D</sub> , Continuous Drain Current	T <sub>A</sub> =25°C	25.5A
	T <sub>A</sub> =70°C	20.4A
P <sub>D</sub> , Power Dissipation <sup>NOTE2</sup>	T <sub>A</sub> =25°C	6.3W
	T <sub>A</sub> =70°C	4W
I <sub>AS</sub> , Avalanche Current <sup>NOTE1</sup>		35A
E <sub>AS</sub> , Single Pulse Avalanche energy L=0.1mH <sup>NOTE1,6</sup>		61mJ
P <sub>D</sub> , Power Dissipation <sup>NOTE3</sup>	T <sub>C</sub> =25°C	36.8W
	T <sub>C</sub> =100°C	14.7W
T <sub>J</sub> , Operation Junction Temperature		-55°C~+150°C
T <sub>STG</sub> , Storage Temperature Range		-55°C~+150°C

Stress beyond above listed "Absolute Maximum Ratings" may lead permanent damage to the device. These are stress ratings only and operations of the device at these or any other conditions beyond those indicated in the operational sections of the specifications are not implied. Exposure to absolute maximum rating conditions for extended periods may affect device reliability.

## THERMAL CHARACTERISTICS

Parameter		Symbol	Typ.	Max.	Units
Thermal Resistance Junction to Ambient <sup>NOTE2</sup>	t ≤ 10s	R <sub>θJA</sub>	-	20	°C/W
Thermal Resistance Junction to Ambient <sup>NOTE2,4</sup>	Steady-State		-	50	
Thermal Resistance Junction to Case	Steady-State	R <sub>θJC</sub>	-	3.4	

NOTE1: Pulsed width limited by maximum junction temperature, T<sub>J(MAX)</sub>=150°C.

NOTE2: Measure the value in a still air environment at T<sub>A</sub>=25°C, using an installation mounted on a 1 in<sup>2</sup> FR-4 board, maximum junction temperature T<sub>J(MAX)</sub>=150°C.

NOTE3: Using junction-to-case thermal resistance, dissipation limit in the case of additional heat.

NOTE4: T<sub>J(MAX)</sub>=150°C, using junction-to-case thermal resistance (R<sub>θJC</sub>) is more useful in additional heat sinking is used.

NOTE5: The pulse test width is ≤300μs and the duty cycle ≤ 2%.

NOTE6: The E<sub>AS</sub> data shows Maximum, tested and pulse width limited by maximum.

NOTE7: \*. The maximum rating current is limited by wire bonding.



## ELECTRICAL CHARACTERISTICS

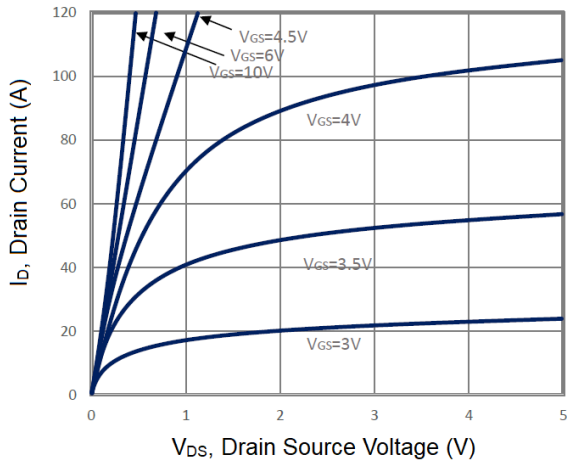
T<sub>A</sub> = 25°C, unless otherwise noted

Parameter	Symbol	Conditions	Min	Typ.	Max	Units
<b>Static Parameters</b>						
Drain-Source Breakdown Voltage	BV <sub>DSS</sub>	V <sub>GS</sub> =0V, I <sub>D</sub> =250μA	30	-	-	V
Gate Threshold Voltage	V <sub>GS(th)</sub>	V <sub>DS</sub> =V <sub>GS</sub> , I <sub>D</sub> =250μA	1.0	1.6	2.5	V
Gate Leakage Current	I <sub>GSS</sub>	V <sub>DS</sub> =0V, V <sub>GS</sub> =±20V	-	-	±100	nA
Zero Gate Voltage Drain Current	I <sub>DSS</sub>	V <sub>DS</sub> =30V, V <sub>GS</sub> =0V T <sub>J</sub> =25°C	-	-	1	μA
		V <sub>DS</sub> =24V, V <sub>GS</sub> =0V T <sub>J</sub> =75°C	-	-	10	
Drain-source On-Resistance <sup>NOTE5</sup>	R <sub>DS(ON)</sub>	V <sub>GS</sub> =10V, I <sub>D</sub> =20A	-	4.5	6	mΩ
		V <sub>GS</sub> =4.5V, I <sub>D</sub> =15A	-	5.6	7	
Forward Transconductance	G <sub>fs</sub>	V <sub>DS</sub> =10V, I <sub>D</sub> =10A	-	8.8	-	S
<b>Diode Characteristics</b>						
Diode Forward Voltage <sup>NOTE5</sup>	V <sub>SD</sub>	I <sub>S</sub> =1A, V <sub>GS</sub> =0V	-	-	1.0	V
Continuous Source Current	I <sub>S</sub>		-	-	50	A
Reverse Recovery Time	t <sub>rr</sub>	I <sub>S</sub> =10A, di/dt=100A/μs	-	12	-	ns
Reverse Recovery Charge	Q <sub>rr</sub>		-	3.5	-	nC
<b>Dynamic and Switching Parameters</b>						
Total Gate Charge	Q <sub>g</sub>	V <sub>DS</sub> =15V, V <sub>GS</sub> =10V, I <sub>D</sub> =10A	-	24.6	33.4	nC
Total Gate Charge (4.5V)	Q <sub>g</sub>		-	12	15	
Gate-Source Charge	Q <sub>gs</sub>		-	2.8	3.5	
Gate-Drain Charge	Q <sub>gd</sub>		-	6	8.1	
Input Capacitance	C <sub>iss</sub>	V <sub>DS</sub> =15V, V <sub>GS</sub> =0V, f=1.0MHz	-	1280	-	pF
Output Capacitance	C <sub>oss</sub>		-	196	-	
Reverse Transfer Capacitance	C <sub>rss</sub>		-	162	-	
Gate Resistance	R <sub>g</sub>	V <sub>GS</sub> =0V, V <sub>DS</sub> =0V, f=1MHZ	-	2.2	-	Ω
Turn-On Time <sup>NOTE5</sup>	t <sub>d(on)</sub>	V <sub>DD</sub> =15V, V <sub>GEN</sub> =10V, R <sub>G</sub> =3.3Ω, I <sub>D</sub> =1A	-	6.4	12	ns
	t <sub>r</sub>		-	14	27	
Turn-Off Time <sup>NOTE5</sup>	t <sub>d(off)</sub>		-	32.4	62	
	t <sub>f</sub>		-	9.2	17	

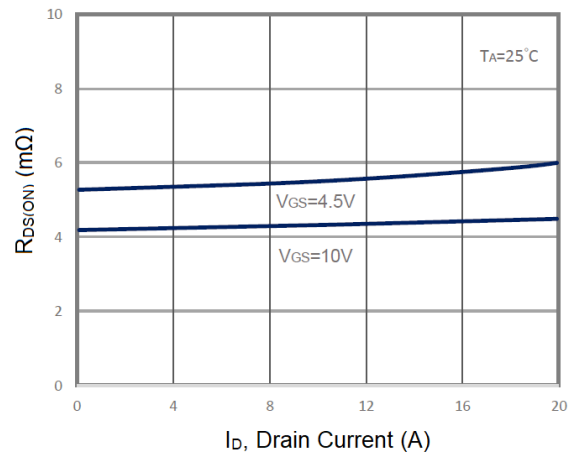


## TYPICAL CHARACTERISTICS

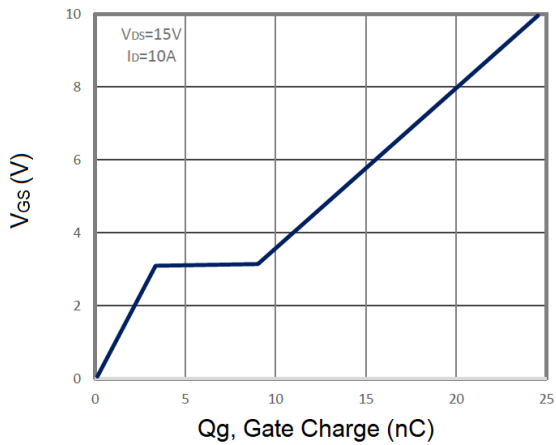
### 1. Output Characteristics



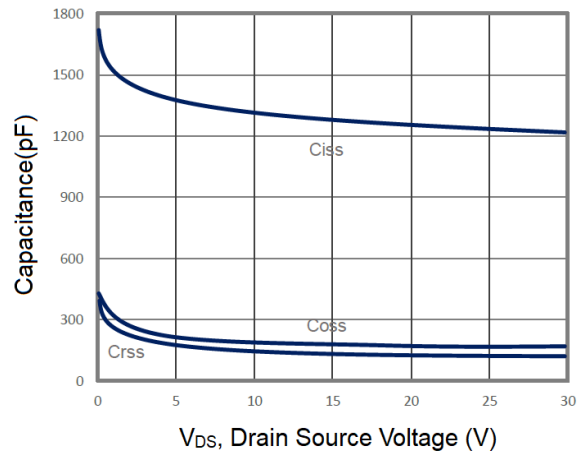
### 2. Drain-Source On Resistance



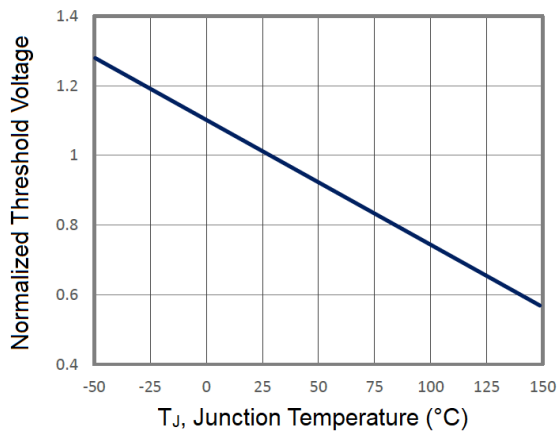
### 3. Gate Charge



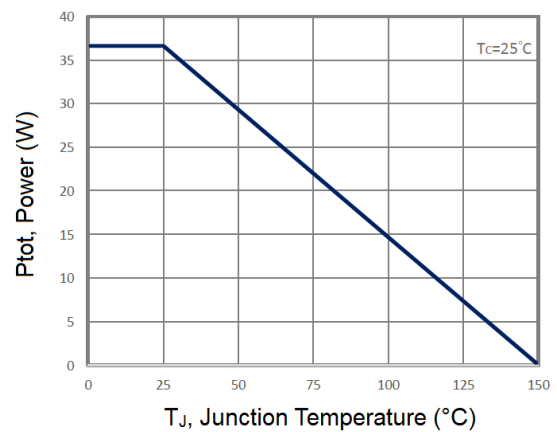
### 4. Capacitance



### 5. Gate Threshold Voltage

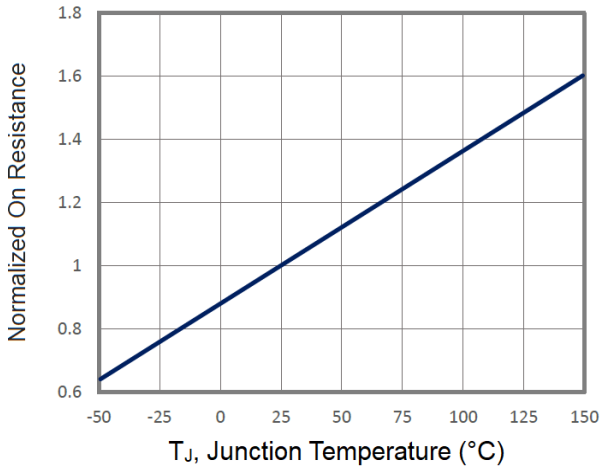


### 6. Power Dissipation

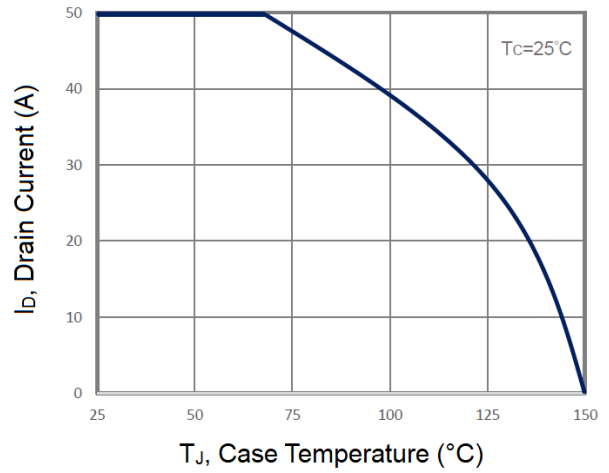




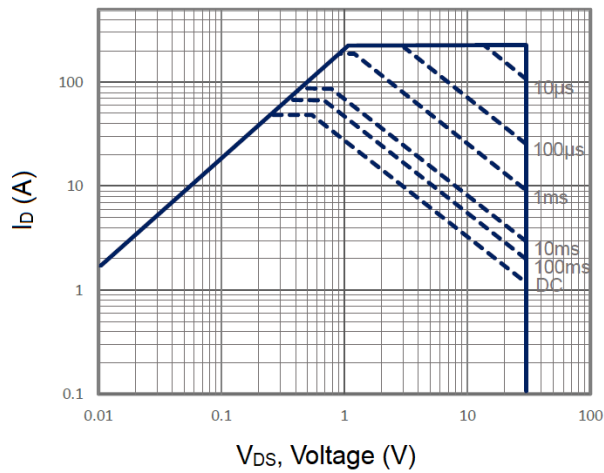
7. On-Resistance vs Junction Temperature



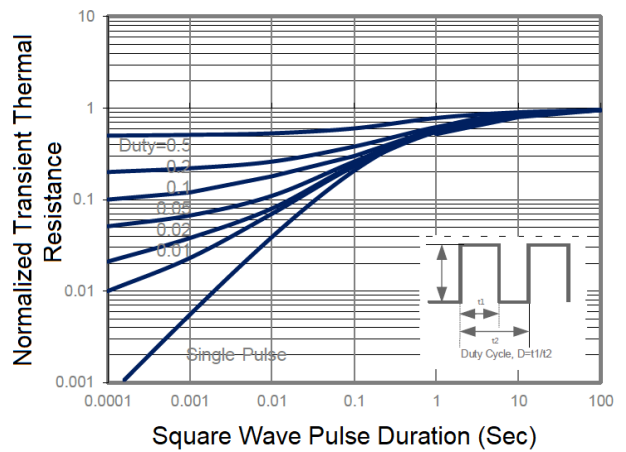
8. Drain Current vs. T<sub>J</sub>



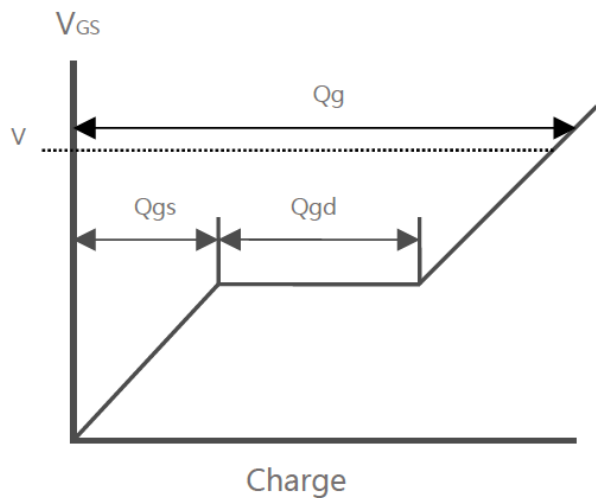
9. Maximum Safe Operation Area



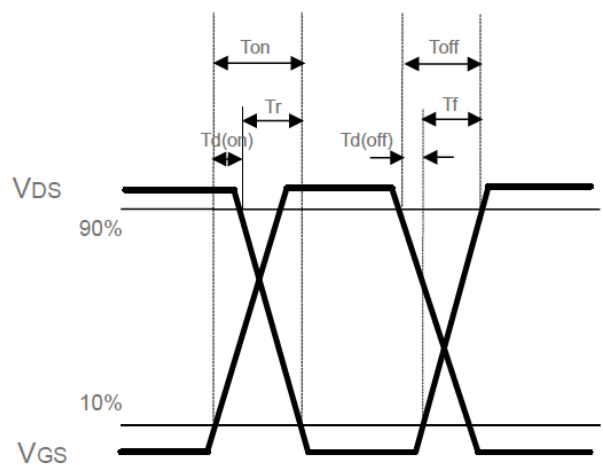
10. Thermal Transient Impedance



11. Gate Charge Waveform



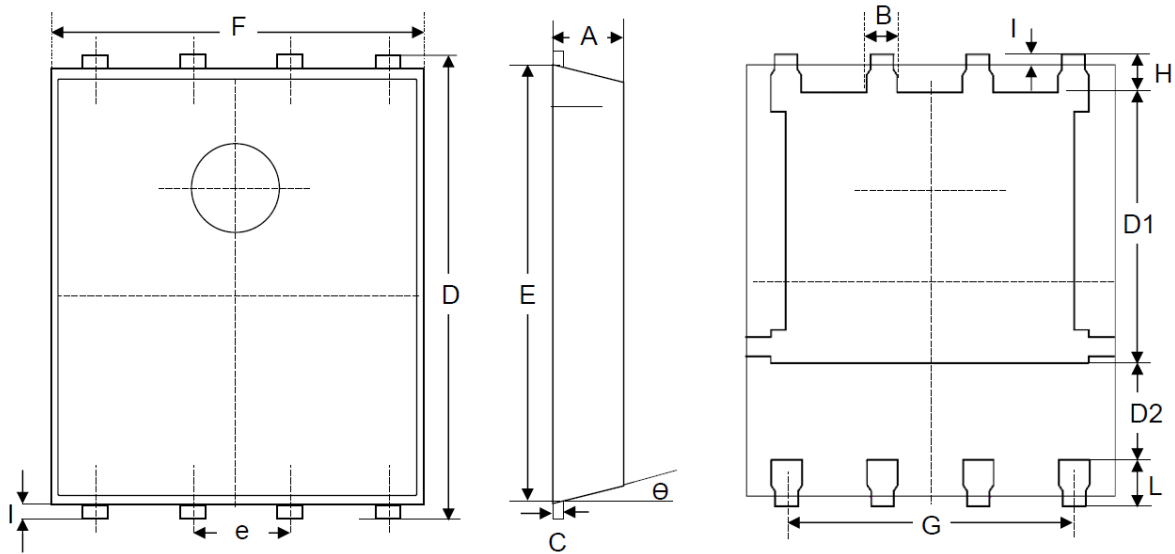
12. Switching Time Waveform





**PACKAGE INFORMATION**

Dimension in DFN8(5x6) (Unit: mm)



Symbol	Millimeters		Inches	
	Min	Max	Min	Max
A	0.900	1.100	0.035	0.043
B	0.330	0.510	0.013	0.020
C	0.200	0.300	0.008	0.012
D	5.900	6.100	0.232	0.240
D1	3.380	3.780	0.133	0.149
D2	1.100	-	0.043	-
E	5.700	5.800	0.224	0.228
e	1.270 BSC		0.050 BSC	
F	4.800	5.000	0.189	0.197
G	0.361	0.396	0.014	0.016
H	0.410	0.610	0.016	0.024
I	0.060	0.200	0.002	0.008
L	0.510	0.710	0.020	0.028
θ	0°	12°	0°	12°



## IMPORTANT NOTICE

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