

SuperMOS – SOP8 -30V BV,9.5mΩ R_{DS}, -12A I_D P-channel MOSFET

1. Description

The ES4407 is P-Channel enhancement MOS Field Effect Transistor. Uses advanced trench technology and design to provide excellent R_{DS(ON)} with low gate charge. Device is suitable for use in DC-DC conversion, power switch and charging circuit. Standard Product ES4407 is Pb-free.

2. Features

- -30V, R_{DS(ON)}=9.5mΩ, V_{GS}=-10V
R_{DS(ON)}=14mΩ, V_{GS}=-4.5V
- Fast Switching
- High density cell design for low R_{DS(on)}
- Material : Halogen free
- Reliable and rugged
- Avalanche Rated
- Low leakage current

3. Applications

- PWM applications
- Load switch
- Power management in portable/desktop PCs
- DC/DC conversion

4. Ordering Information

Part Number	Package	Material	Quantity per reel	Flammability Rating
ES4407	SOP8	Halogen free	3,000 PCS	UL 94V-0

Table-1 Ordering information

5. Pin Configuration and Functions

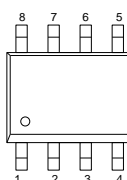
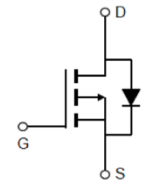
Pin	Function	Outline	Circuit Diagram
4	Gate		
1/2/3	Source		
5/6/7/8	Drain		

Table-2 Pin configuration

6. Specification

Absolute Maximum Rating & Thermal Characteristics

Ratings at 25 °C ambient temperature unless otherwise specified.

Parameter	Symbol	Limit	Unit
Drain-Source Voltage	BV_{DSS}	-30	V
Gate-Source Voltage	V_{GS}	± 25	V
Continuous Drain Current ^a	$T_A=25^\circ\text{C}$	-12	A
	$T_A=100^\circ\text{C}$	-10	
Maximum Power Dissipation ^a	$T_A=25^\circ\text{C}$	3.1	W
	$T_A=100^\circ\text{C}$	2.0	
Pulsed Drain Current ^c	I_{DM}	-60	A
Avalanche Current(L=0.1mH)	I_{AS}	26	A
Avalanche Energy, Single Pulsed	E_{AS}	101	mJ
Operating Junction Temperature	T_J	150	°C
Storage Temperature Range	T_{stg}	-55 to +150	°C

Thermal resistance ratings

Single Operation					
Parameter		Symbol	Typical	Maximum	Unit
Junction-to-Ambient Thermal Resistance ^a	$t \leq 10 \text{ s}$	$R_{\theta JA}$	32	40	°C/W
Junction-to-Case Thermal Resistance	Steady State	$R_{\theta JC}$	17	24	

Note:

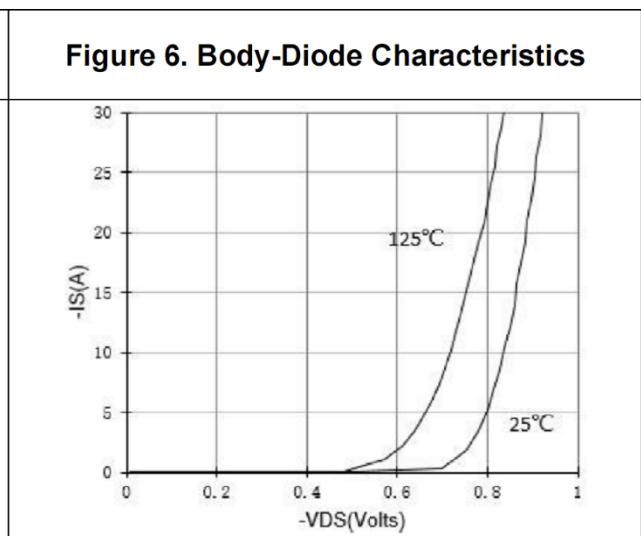
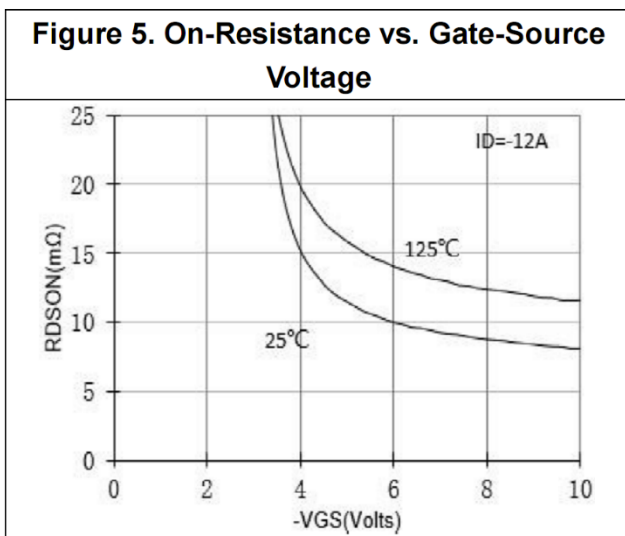
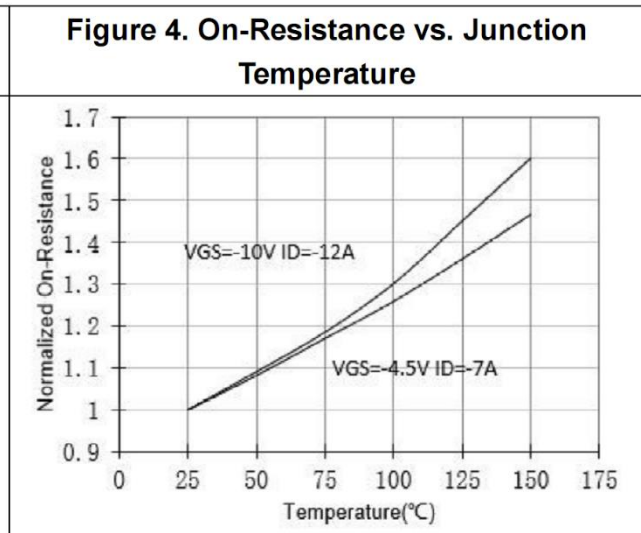
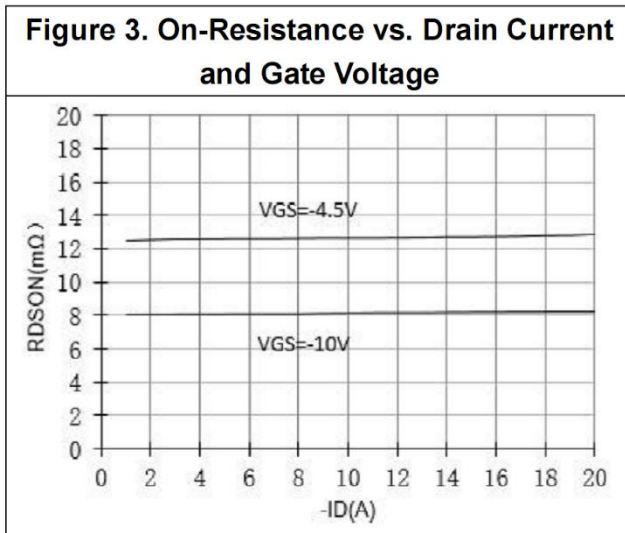
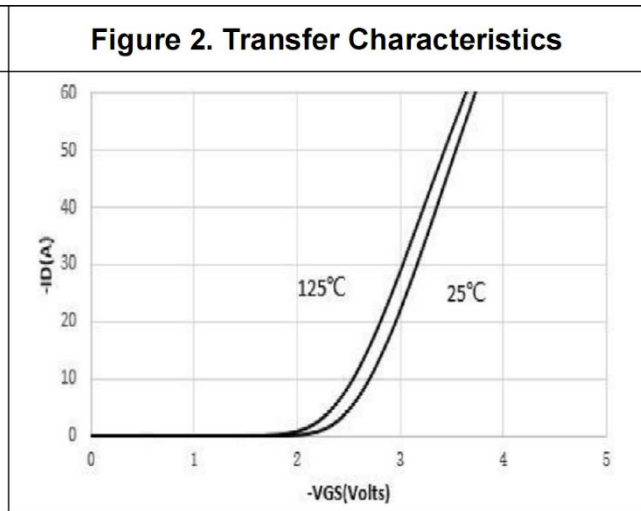
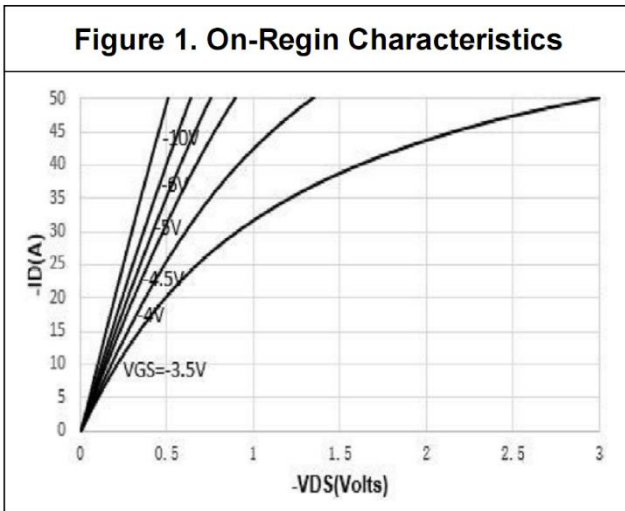
- a Surface mounted on FR4 Board using 1 square inch pad size, 1oz copper
- b Surface mounted on FR4 board using minimum pad size, 1oz copper
- c Repetitive rating, pulse width limited by junction temperature, $t_p=10\mu\text{s}$, Duty Cycle=1%

Electrical Characteristics

At TA = 25°C unless otherwise specified

Parameter	Symbol	Test Conditions	Min.	Typ.	Max.	Unit
OFF CHARACTERISTICS						
Drain-to-Source Breakdown Voltage	BV_{DSS}	$V_{GS}=0V, I_D=-250\mu A$	-30			V
Zero Gate Voltage Drain Current	I_{DSS}	$V_{DS}=-30V, V_{GS}=0V$			-1	μA
Gate-to-source Leakage Current	I_{GSS}	$V_{DS}=0V, V_{GS}=\pm 25V$			± 100	nA
ON CHARACTERISTICS						
Gate Threshold Voltage	$V_{GS(TH)}$	$V_{GS}=V_{DS}, I_D=-250\mu A$	-1	-1.5	-2	V
Drain-to-source On-resistance	$R_{DS(on)}$	$V_{GS}=-10V, I_D=-12A$		9.5	13	m Ω
		$V_{GS}=-4.5V, I_D=-7A$		14	17	
Forward Trans conductance	g_{FS}	$V_{DS}=-5.0V, I_D=-10A$			40	S
CHARGES, CAPACITANCES AND GATE RESISTANCE						
Input Capacitance	C_{ISS}	$V_{GS}=0V, f=1MHz,$ $V_{DS}=-15V$		1780		pF
Output Capacitance	C_{OSS}			235		
Reverse Transfer Capacitance	C_{RSS}			200		
Gate Resistance	R_g	$f=1MHz$		2.5		Ω
Total Gate Charge	$Q_{G(TOT)}$	$V_{GS}=-10V, V_{DS}=-15V,$ $I_D=-15A$		46		nC
Gate-to-Source Charge	Q_{GS}			1.0		
Gate-to-Drain Charge	Q_{GD}			1.4		
SWITCHING CHARACTERISTICS						
Turn-On Delay Time	$t_{d(ON)}$	$V_{GS}=-10V, V_{DS}=-15V,$ $R_L=1\Omega, R_G=3\Omega$		8		ns
Rise Time	t_r			27		
Turn-Off Delay Time	$t_{d(OFF)}$			68		
Fall Time	t_f			39		
BODY DIODE CHARACTERISTICS						
Forward Voltage	V_{SD}	$V_{GS}=0V, I_S=-1.0A$		-0.7	-1	V
Reverse Recovery Time	t_{rr}	$V_{GS}=0V, I_{SD}=-4A,$ $d_i/d_t=100A/\mu s$		13.5		ns
Reverse Recovery Charge	Q_{rr}			3.7		nC

7. Typical Characteristic



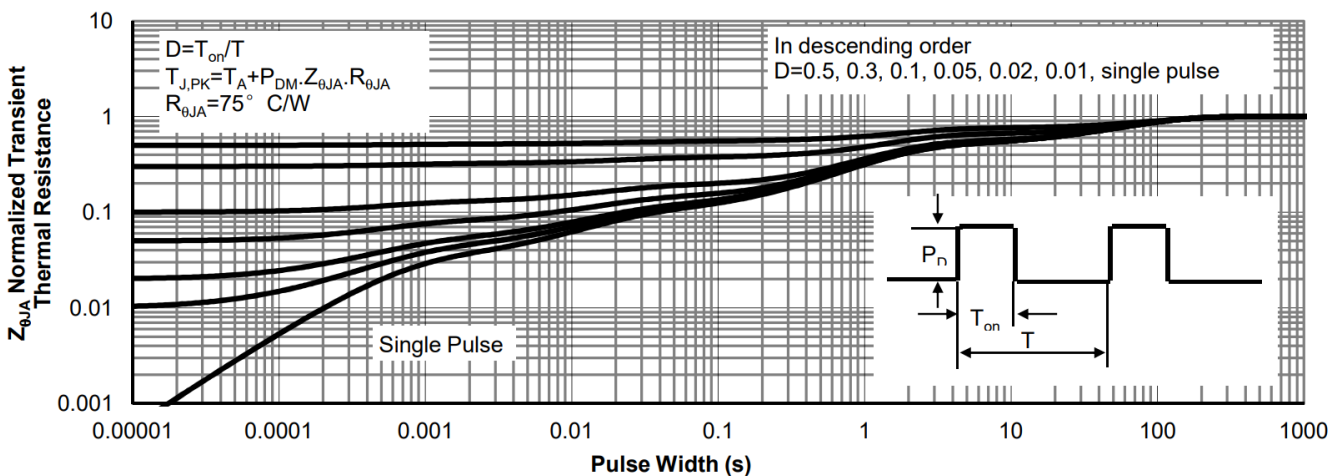
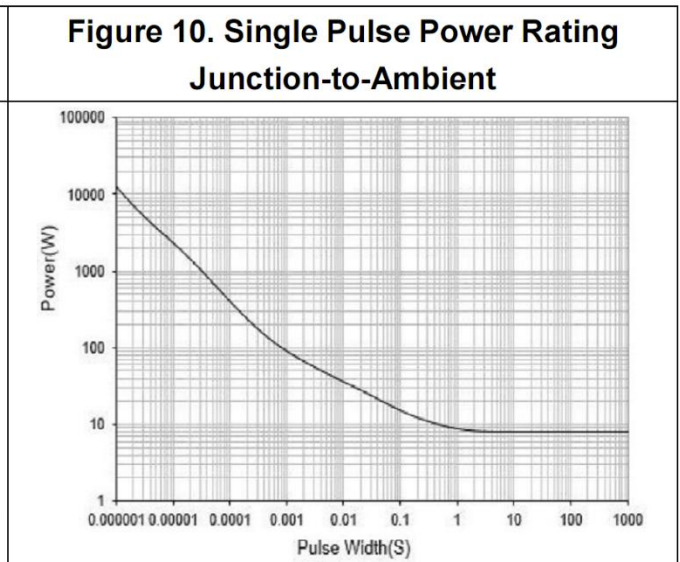
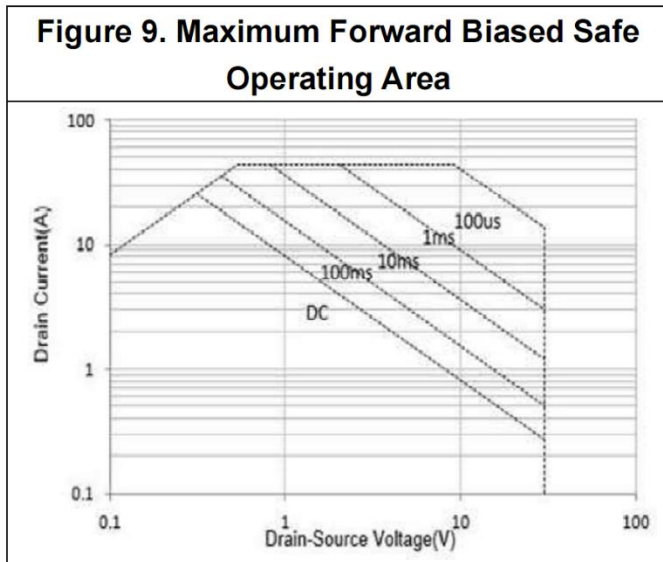
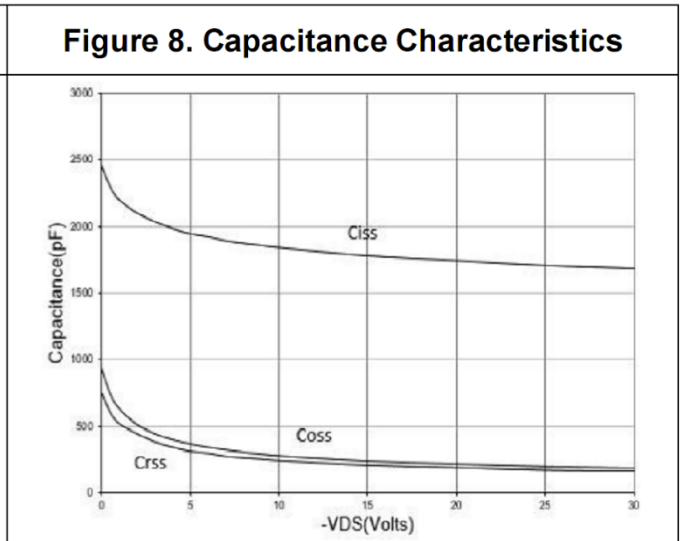
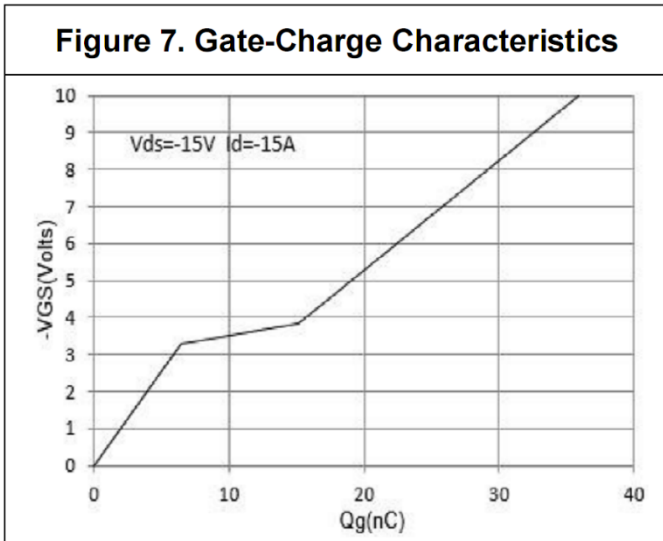
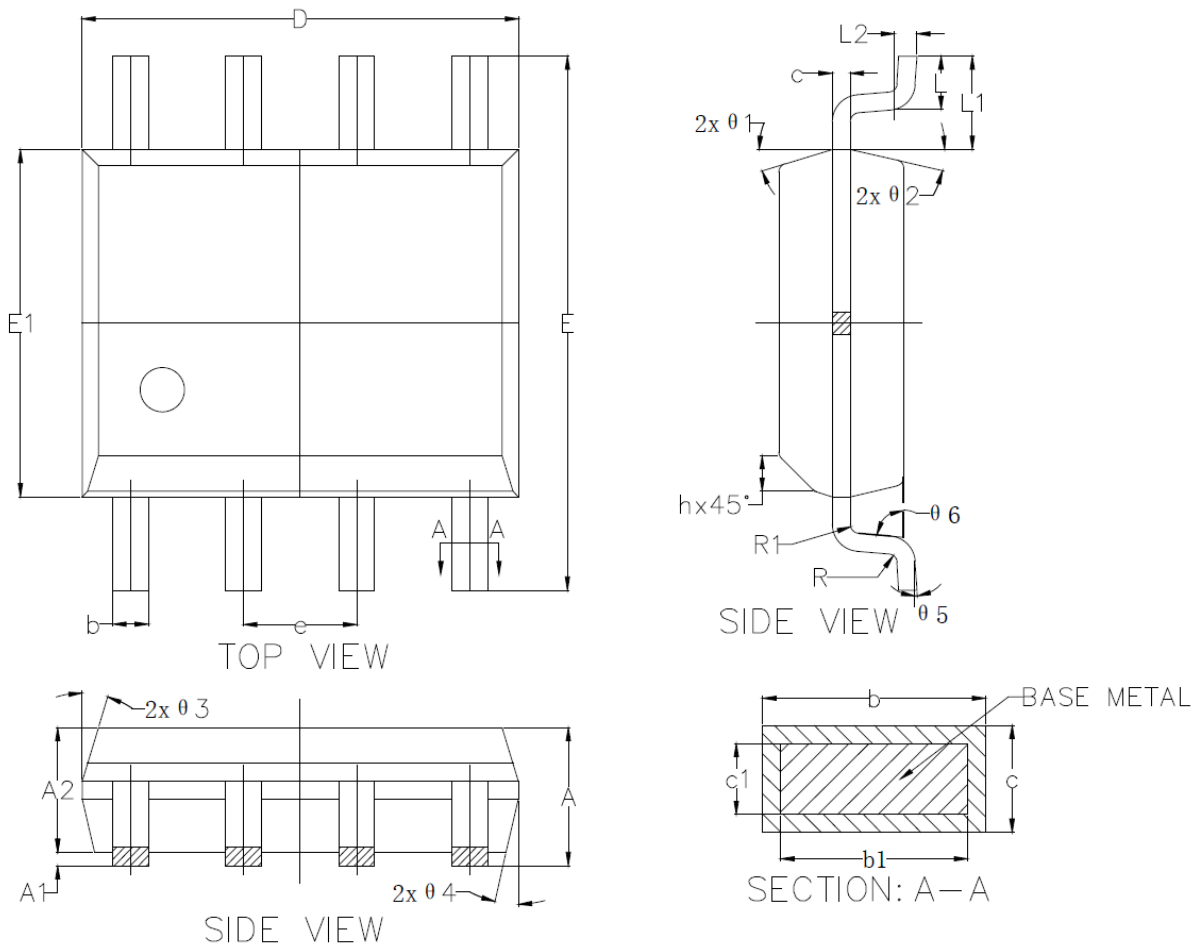


Figure 11: Normalized Maximum Transient Thermal Impedance (Note E)

8. Dimension and Patterns (SOP8)



COMMON DIMENSIONS: UNITS OF MEASURE=MILLIMETER

Symbol	Dimensions			Symbol	Dimensions		
	Min.	Typ.	Max.		Min.	Typ.	Max.
A	1.40	1.55	1.70	L1	0.96	1.06	1.16
A1	0.05		0.25	L2	0.25 BSC		
A2	1.30	1.40	1.50	R	0.07		
b	0.37		0.47	R1	0.07		
b1	0.35		0.45	h	0.25	0.35	0.45
c	0.17		0.27	theta 1	15°	17°	19°
c1	0.15		0.25	theta 2	11°	13°	15°
D	4.80	4.90	5.00	theta 3	15°	17°	19°
E	5.85		6.15	theta 4	11°	13°	15°
E1	3.80	3.90	4.00	theta 5	0°	3°	6°
e	1.27 BSC			theta 6	55°		85°
L	0.57		0.87	Phi	0.40	0.50	0.60

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