

**SuperMOS – SOP8 30V  $BV_{DSS}$  5m $\Omega$   $R_{DS(on)}$  15A  $I_D$ , N-channel MOSFET**

**1. Description**

The ES4576 is N-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 ES4576 is Pb-free.

**2. Features**

- 30V,  $R_{DS(ON)}=5.0m\Omega(Typ.) @V_{GS}=10V$
- $R_{DS(ON)}=7.5m\Omega(Typ.) @V_{GS}=4.5V$
- Use trench MOSFET technology
- High density cell design for low  $R_{DS(on)}$
- Material: Halogen free
- Reliable and rugged
- Avalanche Rated
- Low leakage current

**3. Applications**

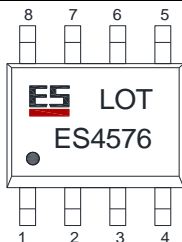
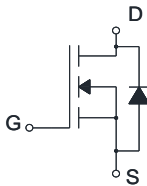
- PWM applications
- Load switch
- Power management in portable/desktop PCs
- DC/DC conversion

**100% UIS TESTED!**

**4. Ordering Information**

Part Number	Package	Marking	Material	Packing	Quantity per reel	Flammability Rating	Reel Size
ES4576	SOP8	.ES4576/lot	Halogen free	Tape & Reel	3,000 PCS	UL 94V-0	13 inches

**5. Pin Configuration and Functions**

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

## 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		$V_{GS}$	$\pm 20$	V
Continuous Drain Current	$T_A=25^\circ\text{C}$	$I_D$	15	A
	$T_A=75^\circ\text{C}$		12	
Maximum Power Dissipation	$T_A=25^\circ\text{C}$	$P_D$	3.1	W
	$T_A=75^\circ\text{C}$		1.9	
Pulsed Drain Current		$I_{DM}$	60	A
Operating Junction Temperature		$T_J$	150	$^\circ\text{C}$
Lead Temperature		$T_L$	260	$^\circ\text{C}$
Storage Temperature Range		$T_{stg}$	-55 to 150	$^\circ\text{C}$

#### Thermal resistance ratings

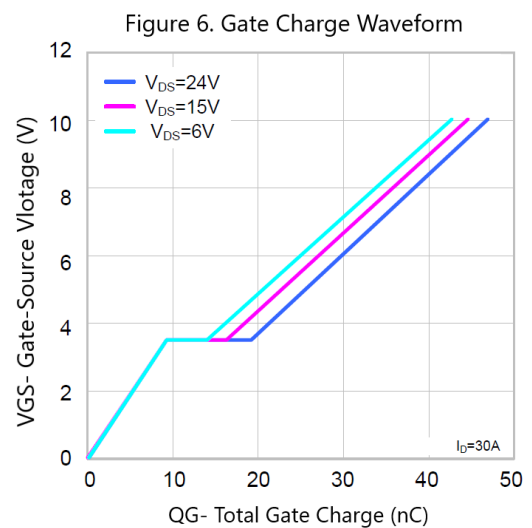
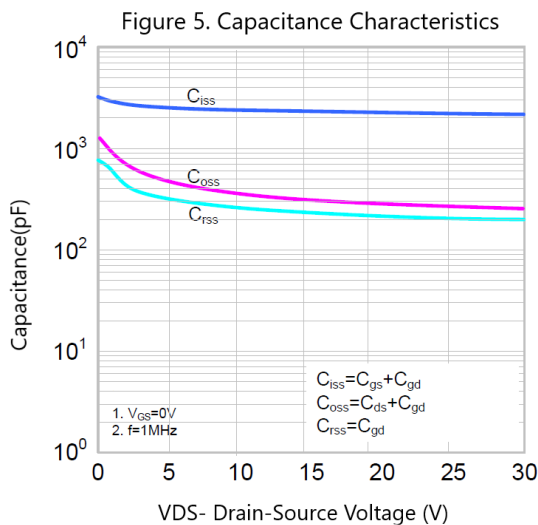
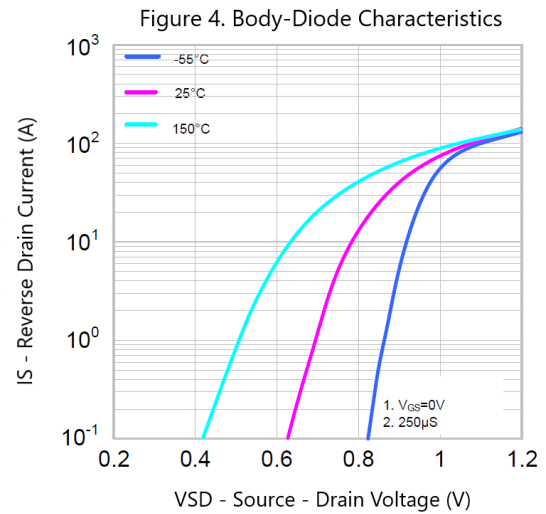
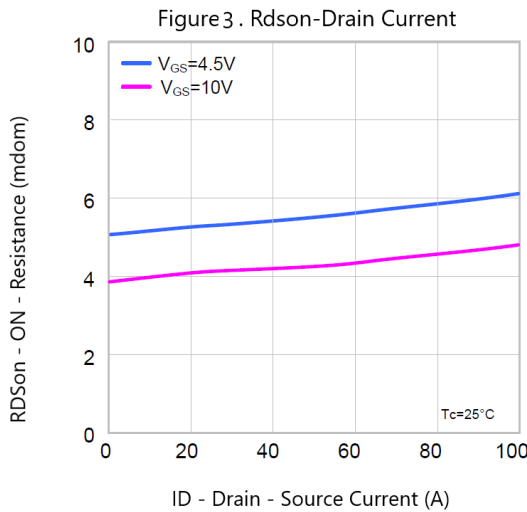
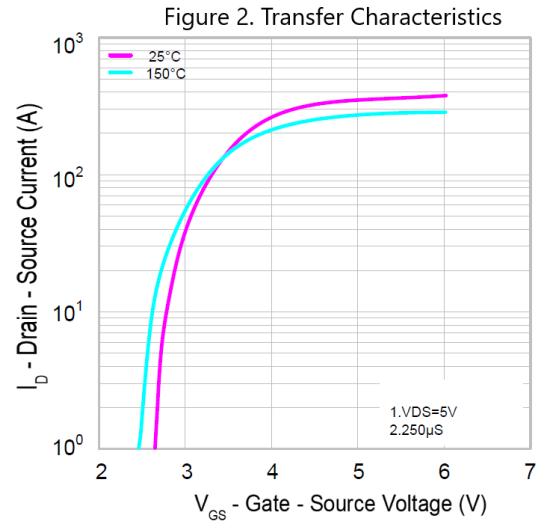
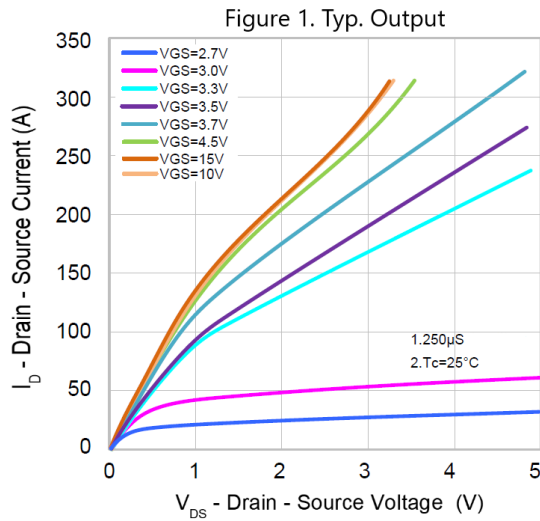
Single Operation				
Parameter		Symbol	Typical	Unit
Junction-to-Ambient Thermal Resistance	$t \leq 10 \text{ s}$	$R_{\theta JA}$	40	$^\circ\text{C/W}$
Junction-to-Case Thermal Resistance	Steady State	$R_{\theta JC}$	4.2	

## Electrical Characteristics

At TA = 25°C unless otherwise specified

Parameter	Symbol	Test Conditions	Min.	Typ.	Max.	Unit
<b>OFF CHARACTERISTICS</b>						
Drain-to-Source Breakdown Voltage	$BV_{DSS}$	$V_{GS}=0V, I_D=250\mu A$	30			V
Zero Gate Voltage Drain Current	$I_{DSS}$	$V_{DS}=30V, V_{GS}=0V$			1.0	$\mu A$
Gate-to-source Leakage Current	$I_{GSS}$	$V_{DS}=0V, V_{GS}=\pm 20V$			$\pm 100$	nA
<b>ON CHARACTERISTICS</b>						
Gate Threshold Voltage	$V_{GS(TH)}$	$V_{GS}=V_{DS}, I_D=250\mu A$	1.0	1.75	2.5	V
Drain-to-source On-resistance	$R_{DS(on)}$	$V_{GS}=10V, I_D=15A$		5.0	8.5	m $\Omega$
		$V_{GS}=4.5V, I_D=10A$		7.5	10.5	
Forward Trans conductance	$g_{FS}$	$V_{DS}=5.0V, I_D=15A$			80	S
<b>CHARGES, CAPACITANCES AND GATE RESISTANCE</b>						
Input Capacitance	$C_{ISS}$	$V_{GS}=0V, f=1MHz,$ $V_{DS}=25V$		2200		pF
Output Capacitance	$C_{OSS}$			275		
Reverse Transfer Capacitance	$C_{RSS}$			242		
Total Gate Charge	$Q_{G(TOT)}$	$V_{GS}=10V, V_{DS}=24V,$ $I_D=15A$		48		nC
Gate-to-Source Charge	$Q_{GS}$			8.8		
Gate-to-Drain Charge	$Q_{GD}$			10.0		
<b>SWITCHING CHARACTERISTICS</b>						
Turn-On Delay Time	$t_{d(ON)}$	$V_{GS}=10V, V_{DS}=20V,$ $I_D=15A, R_G=1.8\Omega$		12.5		ns
Rise Time	$t_r$			90		
Turn-Off Delay Time	$t_{d(OFF)}$			142		
Fall Time	$t_f$			85		
<b>BODY DIODE CHARACTERISTICS</b>						
Forward Voltage	$V_{SD}$	$V_{GS}=0V, I_S=1.0A$		0.75	1.5	V

## 7. Typical Characteristic



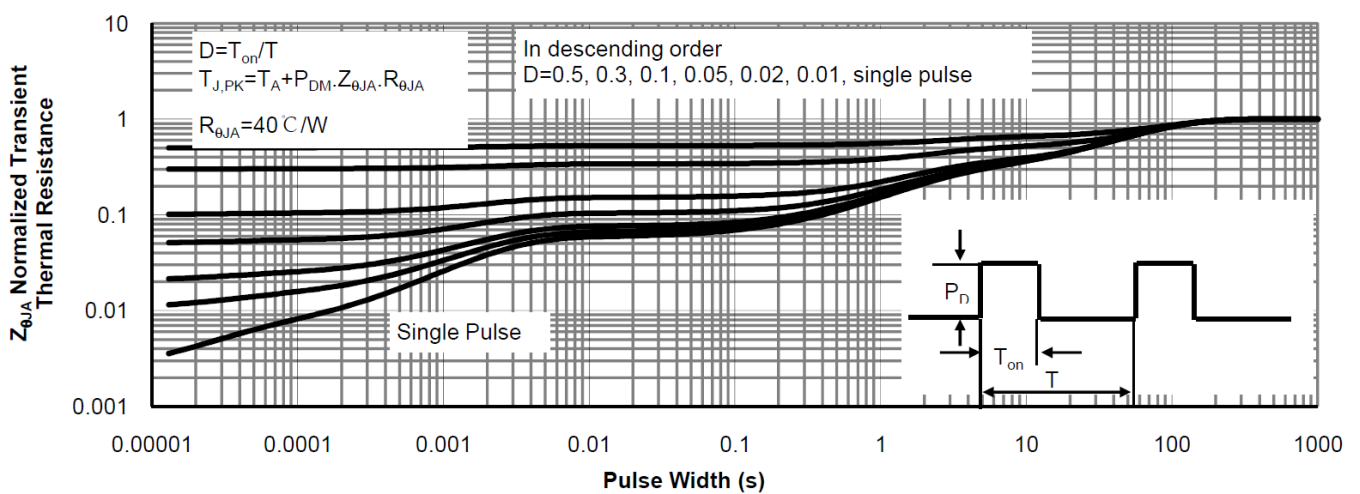
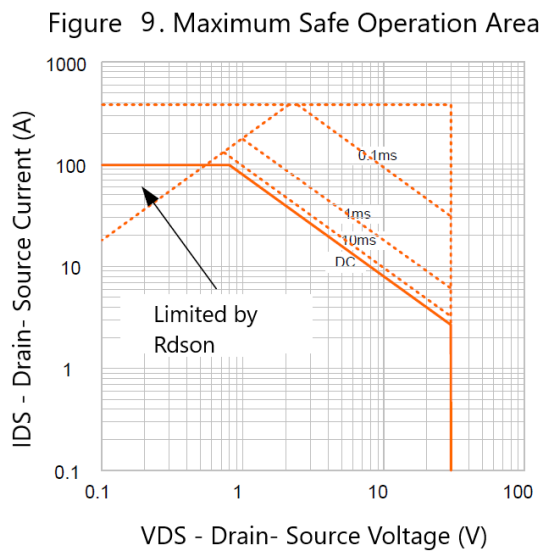
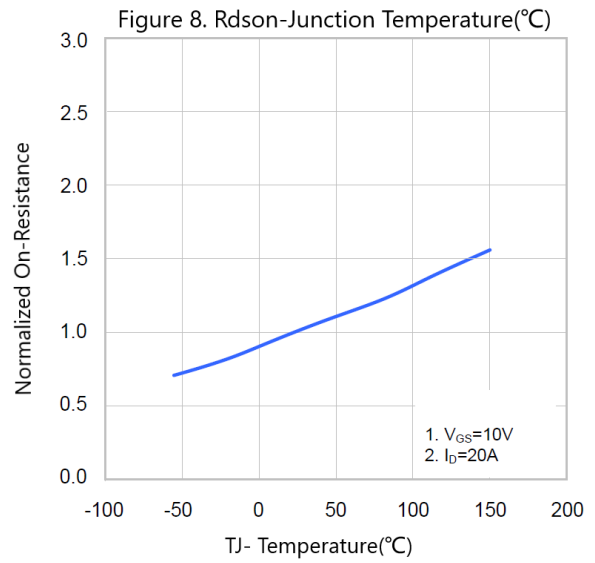
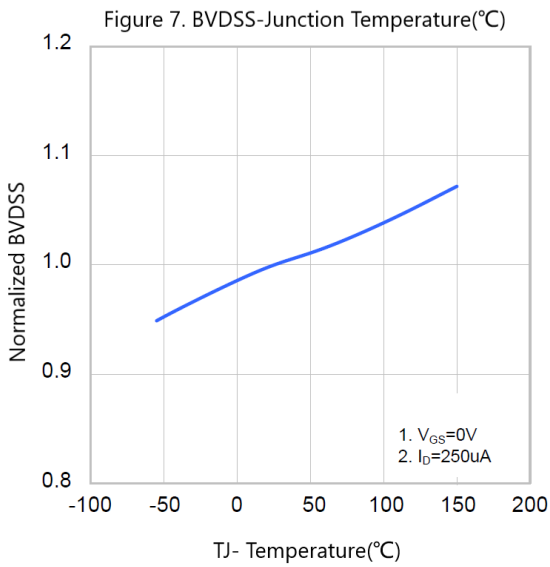
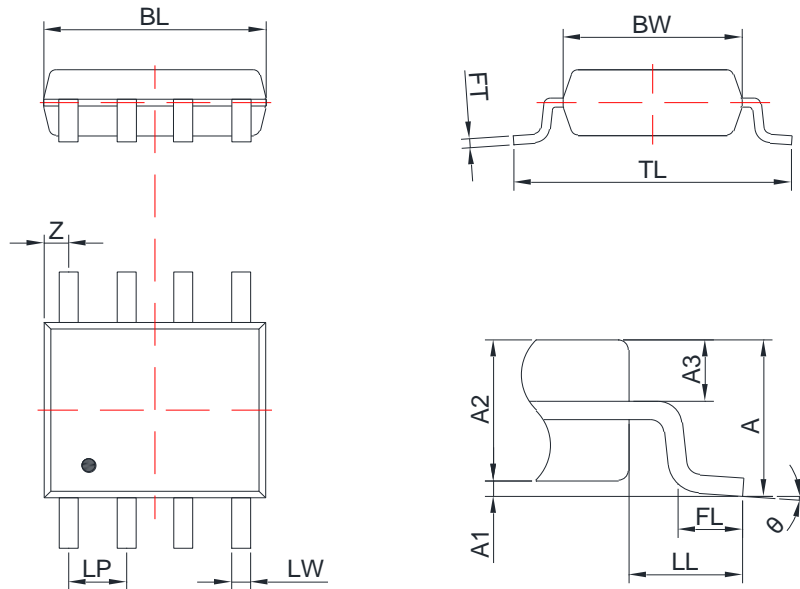


Figure 10: Normalized Maximum Transient Thermal Impedance

8. Dimension (SOP8)



COMMON DIMENSIONS: UNITS OF MEASURE=MILLIMETER

Symbol	Dimensions		Symbol	Dimensions	
	Min.	Max.		Min.	Max.
A	1.75		FL	0.50	0.80
A1	0.05	0.15	LP	1.25	1.30
A2	1.40	1.50	LL	1.1 BSC	
A3	0.623 BSC		LW	0.38	0.43
BL	4.92	5.80	TL	5.90	6.10
BW	3.70	4.10	Z	0.54	
FT	0.20	0.21	θ	0°	8°

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