

SuperMOS – TO-252 -60V V_{DSS} , 27m Ω $R_{DS(on)}$, -28A I_D P-channel MOSFET

1. Description

The ESD409 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 ESD409 is Pb-free.

2. Features

- -60V, $R_{DS(ON)}=27m\Omega(Typ)$, $V_{GS}=-10V$
 $R_{DS(ON)}=31m\Omega(Typ)$, $V_{GS}=-4.5V$
- 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

100% UIS TESTED

4. Ordering Information

Part Number	Package	Marking	Material	Packing	Quantity per Reel	Flammability Rating
ESD409	TO-252	ESD409/lot	Halogen free	Tape & Reel	2,500 PCS	UL 94V-0

Table-1 Ordering information

5. Pin Configuration and Functions


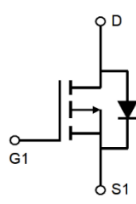
Pin	Function	Outline	Circuit Diagram
3	Source		
1	Gate		
2	Drain		

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}	-60	V
Gate-Source Voltage	V_{GS}	± 20	V
Continuous Drain Current	I_D	$T_C=25^\circ\text{C}$	-28
		$T_C=75^\circ\text{C}$	-22
Maximum Power Dissipation	P_D	$T_C=25^\circ\text{C}$	50
		$T_C=75^\circ\text{C}$	30
Pulsed Drain Current	I_{DM}	-132	A
Operating Junction Temperature	T_J	150	$^\circ\text{C}$
Storage Temperature Range	T_{stg}	-55 to +150	$^\circ\text{C}$

Thermal resistance ratings

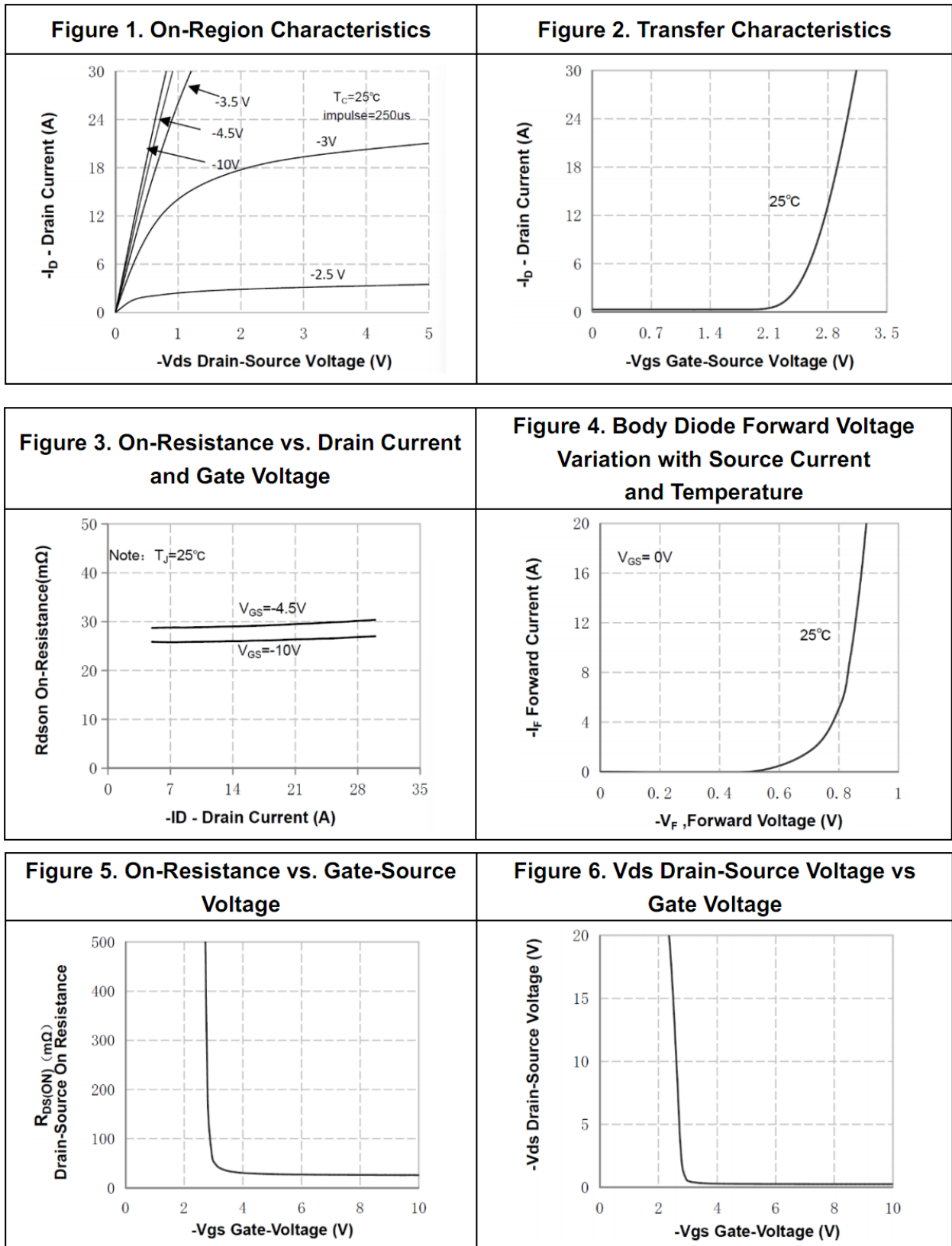
Single Operation				
Parameter	Symbol	Typical	Maximum	Unit
Junction-to- Case Thermal Resistance($t \leq 10\text{s}$)	$R_{\theta JC}$	1.9	2.5	$^\circ\text{C/W}$

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}	$V_{GS}=0V, I_D=-250\mu A$	-60			V
Zero Gate Voltage Drain Current	I_{DSS}	$V_{DS}=-60V, V_{GS}=0V$			-1	μA
Gate-to-source Leakage Current	I_{GSS}	$V_{DS}=0V, V_{GS}=\pm 20V$			± 100	nA
ON CHARACTERISTICS						
Gate Threshold Voltage	$V_{GS(TH)}$	$V_{GS}=V_{DS}, I_D=-250\mu A$	-1.1	-1.6	-2.1	V
Drain-to-source On-resistance	$R_{DS(on)}$	$V_{GS}=-10V, I_D=-20A$		27	34	m Ω
		$V_{GS}=-4.5V, I_D=-20A$		31	38	
Forward Transconductance	g_{FS}	$V_{DS}=-5V, I_D=-20A$			60	S
CHARGES, CAPACITANCES AND GATE RESISTANCE						
Input Capacitance	C_{ISS}	$V_{GS}=0V$ $V_{DS}=-20V$ $f=1MHz$		3020		pF
Output Capacitance	C_{OSS}			180		
Reverse Transfer Capacitance	C_{RSS}			160		
Total Gate Charge	$Q_{G(TOT)}$	$V_{GS}=-10V$ $V_{DS}=-20V$ $I_D=-10A$		46.6		nC
Gate-to-Source Charge	Q_{GS}			9.1		
Gate-to-Drain Charge	Q_{GD}			6.2		
SWITCHING CHARACTERISTICS						
Turn-On Delay Time	$t_{d(ON)}$	$V_{GS}=-10V, V_{DS}=-15V,$ $I_D=-1A, R_G=3\Omega$		45		ns
Rise Time	t_r			28		
Turn-Off Delay Time	$t_{d(OFF)}$			80		
Fall Time	t_f			6.6		
BODY DIODE CHARACTERISTICS						
Forward Voltage	V_{SD}	$V_{GS}=0V, I_S=-1.0A$			-1.2	V

7. Typical Characteristic



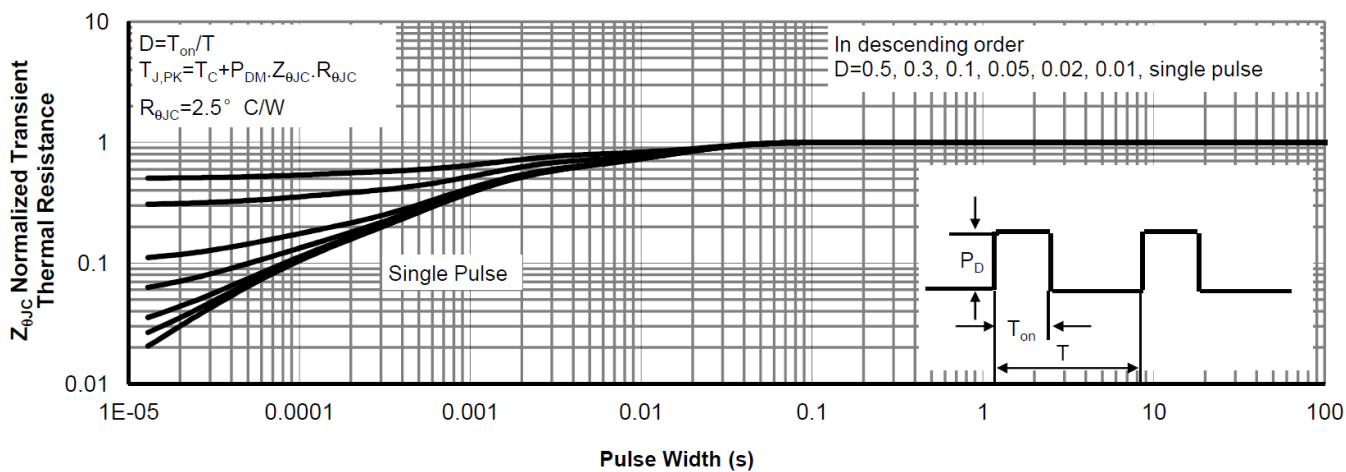
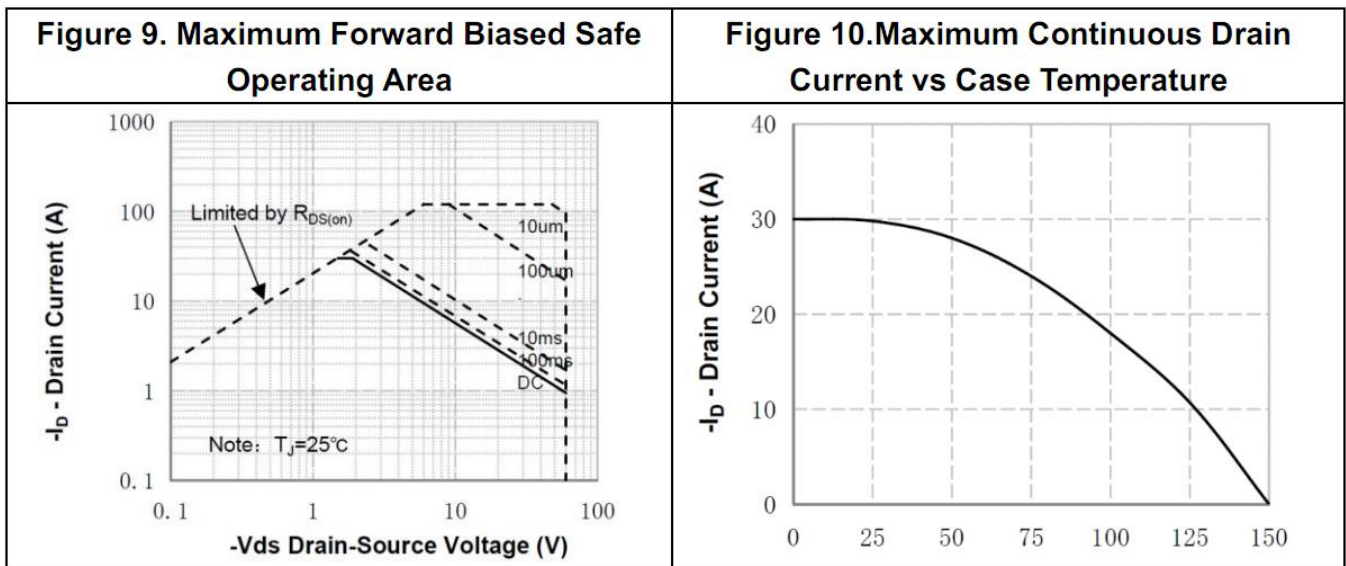
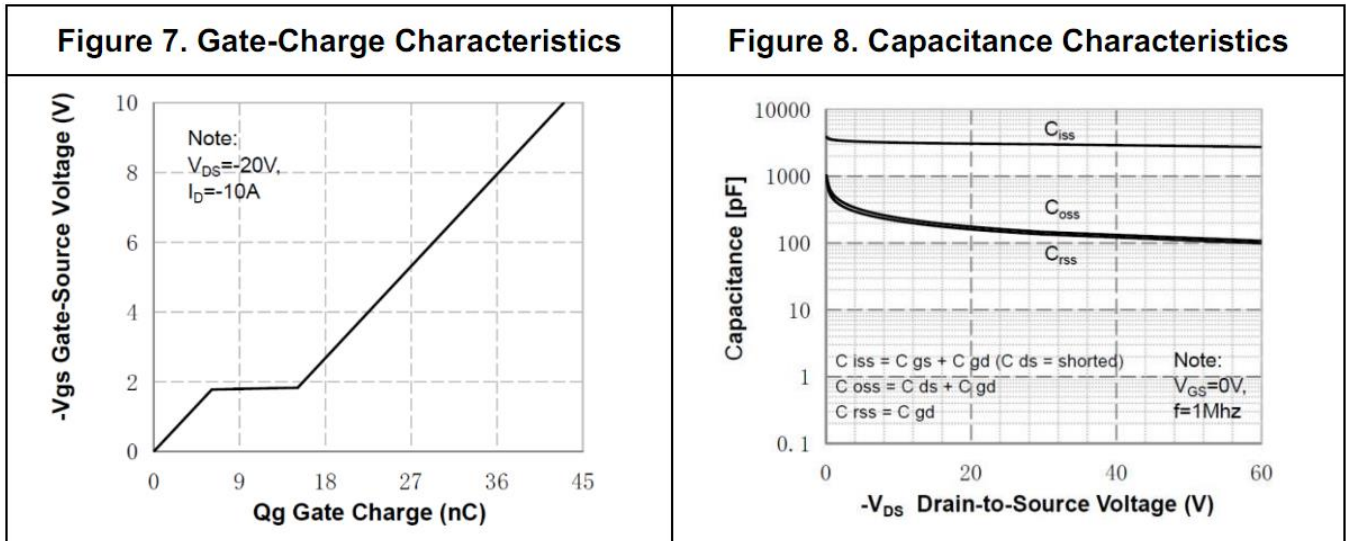
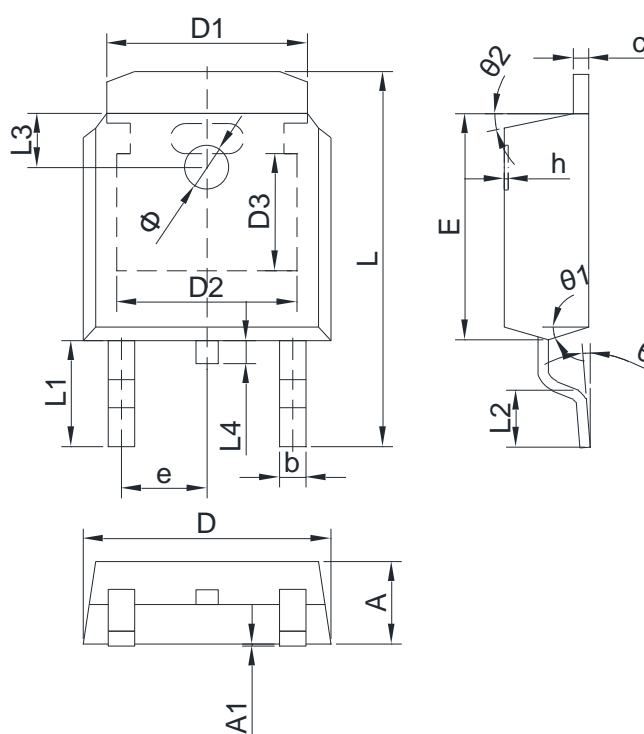


Figure 11: Normalized Maximum Transient Thermal Impedance

8. Dimension (TO-252)



SYMBOL	MILLIMETER			SYMBOL	MILLIMETER		
	MIN	Typ.	MAX		MIN	Typ.	MAX
A	2.200	2.300	2.400	h	0.000	0.100	0.200
A1	0.000		0.127	L	9.900	10.100	10.300
b	0.640	0.690	0.740	L1	2.888 REF		
C(电镀后)	0.460	0.520	0.580	L2	1.400	1.550	1.700
D	6.500	6.600	6.700	L3	1.600 REF		
D1	5.334 REF			L4	0.600	0.800	1.000
D2	4.826 REF			Φ	1.100	1.200	1.300
D3	3.166 REF			θ	0°		8°
E	6.000	6.100	6.200	θ1	9° TYP		
e	2.286 TYP			θ2	9° TYP		

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