

SuperMOS – TO-252 -30V BV_{DSS} , $8m\Omega$ $R_{DS(ON)}$, P-channel MOSFET

1. Description

The ESD403 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 ESD403 is Pb-free.

2. Features

- -30V, $R_{DS(ON)}=8m\Omega(TYP)$ @ $V_{GS}=-10V$
 $R_{DS(ON)}=11.5m\Omega(TYP)$ @ $V_{GS}=-4.5V$
- 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	Reel size
ESD403	TO-252	ESD403/lot	Halogen free	Tape & Reel	2,500 PCS	UL 94V-0	13 inches

Table-1 Ordering information

5. Pin Configuration and Functions

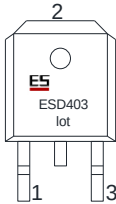
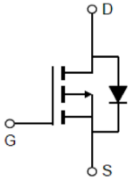
Pin	Function	Outline	Circuit Diagram
1	Gate		
3	Source		
2	Drain		

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}	-30	V
Gate-Source Voltage		V_{GS}	±25	V
Continuous Drain Current ^a	$T_C=25^{\circ}C$	I_D	-62	A
	$T_C=75^{\circ}C$		-48	
Maximum Power Dissipation ^a	$T_C=25^{\circ}C$	P_D	79	W
	$T_C=75^{\circ}C$		47	
Pulsed Drain Current ^b		I_{DM}	-200	A
Avalanche Current, Single Pulsed ^c		I_{AS}	24	A
Avalanche Energy, Single Pulsed ^c		E_{AS}	86.4	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	$t \leq 10\text{ s}$	$R_{\theta JA}$	16	20	°C/W
Junction-to-Case Thermal Resistance	Steady State	$R_{\theta JC}$	0.9	1.6	

Note:

a: Surface mounted on FR4 Board using 1 square inch pad size, 1oz copper

b: Repetitive rating, pulse width limited by junction temperature, $t_p=10\mu\text{s}$, Duty Cycle=1%

c: EAS condition: $T_J=25^{\circ}C$, $V_{DD}=-30V$, $V_G=-10V$, $L=0.3mH$, $R_g=25\Omega$

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 =-250uA	-30			V
Zero Gate Voltage Drain Current	I _{DSS}	V _{DS} =-30V, V _{GS} =0V			-1	uA
Gate-to-source Leakage Current	I _{GSS}	V _{DS} =0V, V _{GS} =±25V			±100	nA
ON CHARACTERISTICS						
Gate Threshold Voltage	V _{GS(TH)}	V _{GS} =V _{DS} , I _D =-250uA	-1	-1.5	-2	V
Drain-to-source On-resistance	R _{DS(on)}	V _{GS} =-10V, I _D =-20A		8	12	mΩ
		V _{GS} =-4.5V, I _D =-20A		11.5	18	
Forward Trans conductance	g _{FS}	V _{DS} =-5.0V, I _D =-20A			80	S
CHARGES, CAPACITANCES AND GATE RESISTANCE						
Input Capacitance	C _{ISS}	V _{GS} =0V, f=1MHz, V _{DS} =15V		2890	3500	pF
Output Capacitance	C _{OSS}			585	760	
Reverse Transfer Capacitance	C _{RSS}			470	660	
Gate Resistance	R _g	f=1MHZ		3.8	5.7	Ω
Total Gate Charge	Q _{G(TOT)}	V _{GS} =-10V, V _{DS} =-15V, I _D =-20A		51	61	nC
Gate-to-Source Charge	Q _{GS}			12	14	
Gate-to-Drain Charge	Q _{GD}			16	22	
SWITCHING CHARACTERISTICS						
Turn-On Delay Time	t _{d(ON)}	V _{GS} =-10V, V _{DS} =-15V, R _L =1Ω, R _G =3Ω		16		ns
Rise Time	t _r			12		
Turn-Off Delay Time	t _{d(OFF)}			45		
Fall Time	t _f			22		
BODY DIODE CHARACTERISTICS						
Forward Voltage	V _{SD}	V _{GS} =0V, I _S =-1.0A		-0.7	-1	V

7. Typical Characteristic

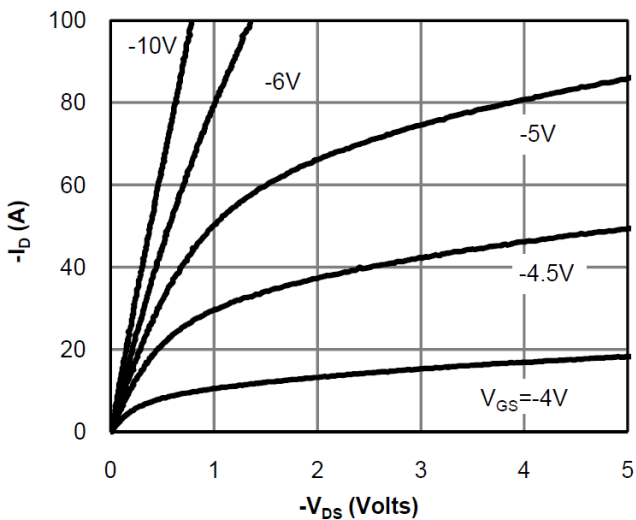


Fig 1: On-Region Characteristics

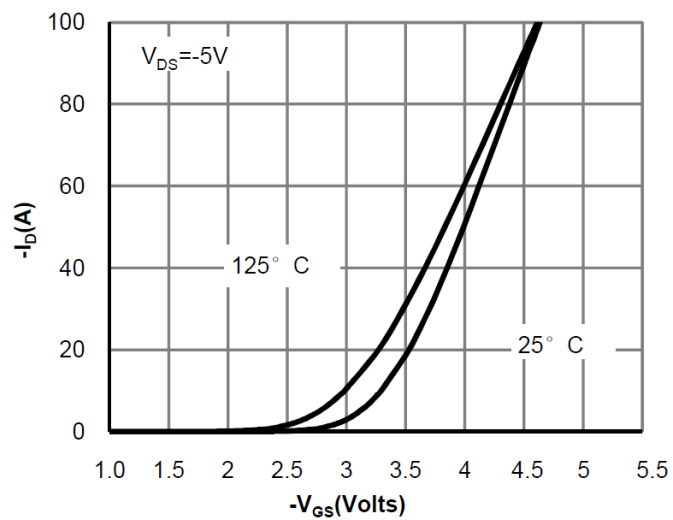


Figure 2: Transfer Characteristics

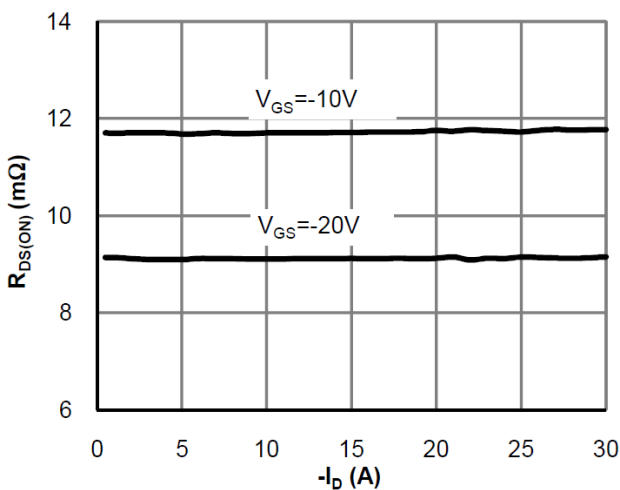


Figure 3: On-Resistance vs. Drain Current and Gate voltage

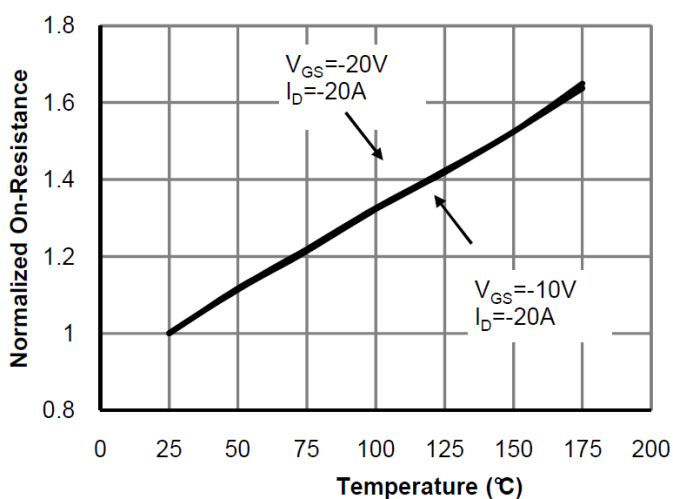


Figure 4: On-Resistance vs. Junction Temperature

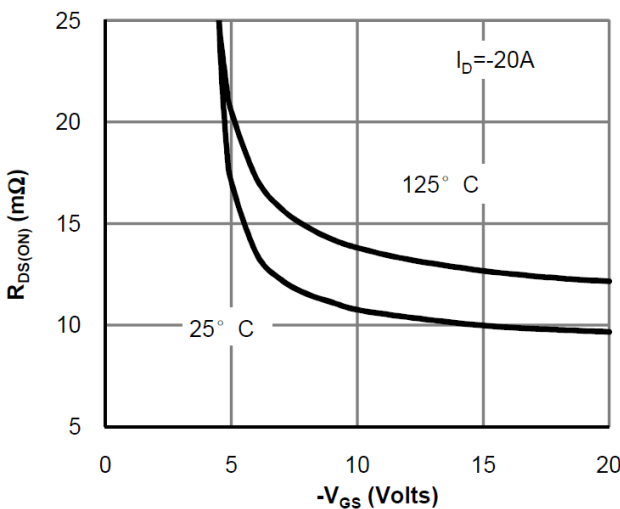


Figure 5: On-Resistance vs. Gate-Source Voltage

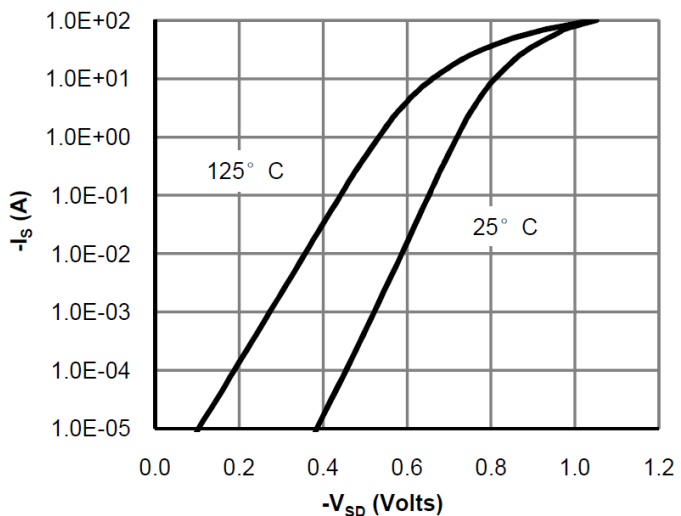


Figure 6: Body-Diode Characteristics

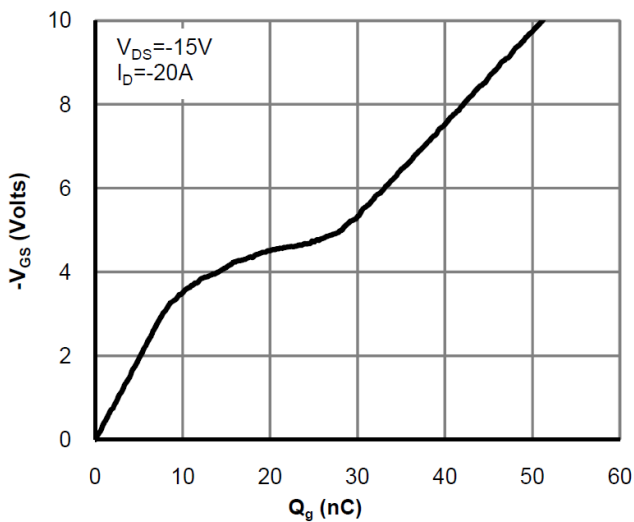


Figure 7: Gate-Charge Characteristics

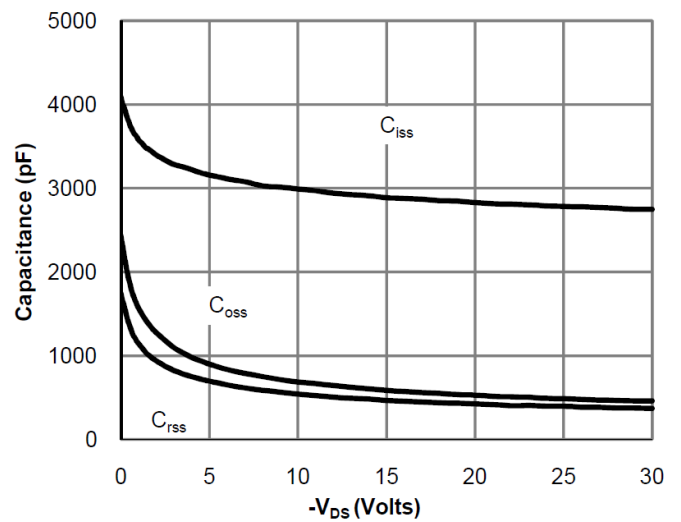


Figure 8: Capacitance Characteristics

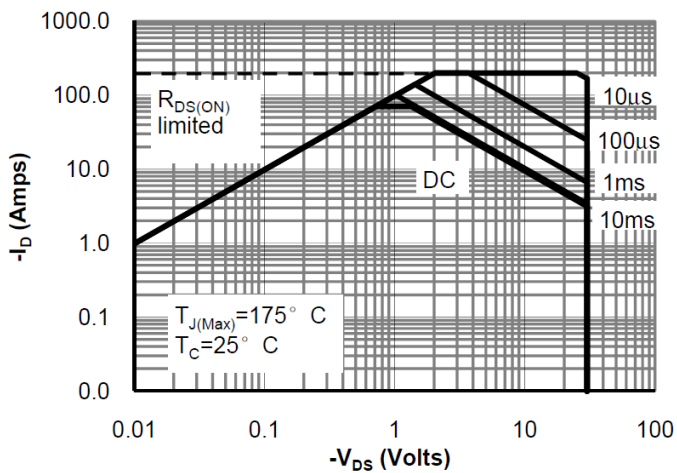


Figure 9: Maximum Forward Biased Safe Operating Area

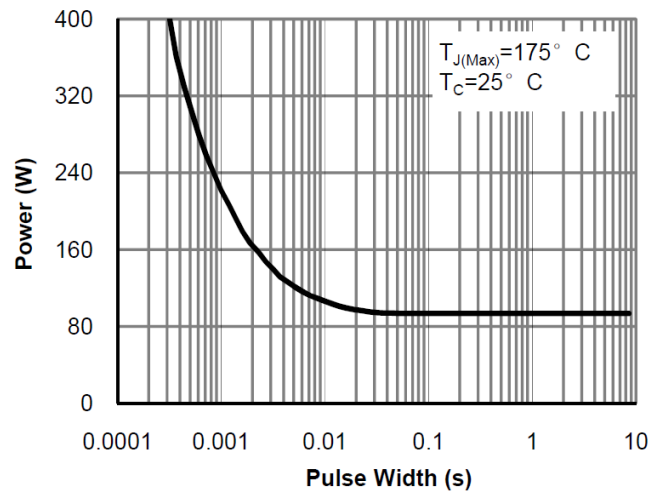


Figure 10: Single Pulse Power Rating Junction-to-Case

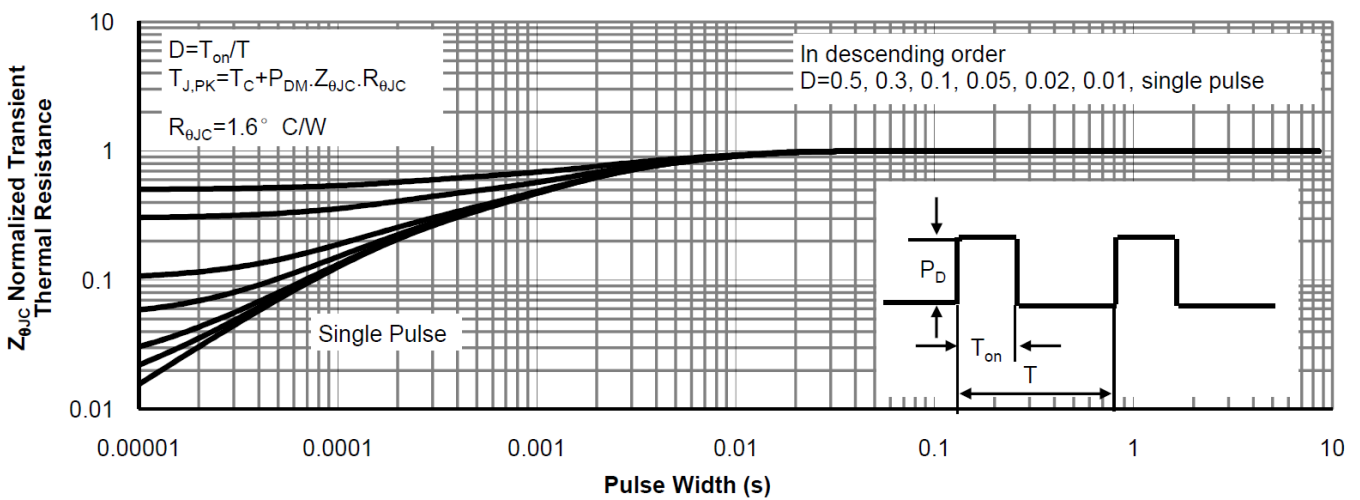
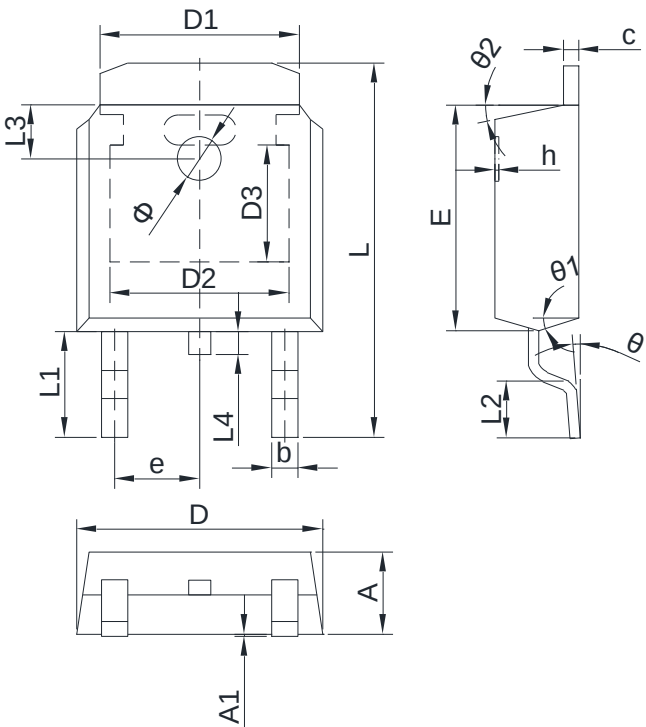


Figure 11: Normalized Maximum Transient Thermal Impedance

8. Dimension and Patterns (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		

DISCLAIMER

ELECSUPER PROVIDES TECHNICAL AND RELIABILITY DATA (INCLUDING DATASHEETS), DESIGN RESOURCES (INCLUDING REFERENCE DESIGNS), APPLICATION OR OTHER DESIGN ADVICE, SAFETY INFORMATION, AND OTHER RESOURCES “AS IS” AND WITH ALL FAULTS, AND DISCLAIMS ALL WARRANTIES, EXPRESS AND IMPLIED, INCLUDING WITHOUT LIMITATION ANY IMPLIED WARRANTIES OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE OR NON-INFRINGEMENT OF THIRD PARTY INTELLECTUAL PROPERTY RIGHTS.

These resources are intended for skilled developers designing with ElecSuper products. You are solely responsible for

- (1) selecting the appropriate ElecSuper products for your application;
- (2) designing, validating and testing your application;
- (3) ensuring your application meets applicable standards, and any other safety, security, or other requirements.

These resources are subject to change without notice. ElecSuper grants you permission to use these resources only for development of an application that uses the ElecSuper products described in the resource. Other reproduction and display of these resources are prohibited. No license is granted to any other ElecSuper intellectual property right or to any third party intellectual property right. ElecSuper disclaims responsibility for, and you will fully indemnify ElecSuper and its representatives against, any claims, damages, costs, losses, and liabilities arising out of your use of these resources. ElecSuper's products are provided subject to ElecSuper's Terms of Sale or other applicable terms available either on www.elecsuper.com or provided in conjunction with such ElecSuper products. ElecSuper's provision of these resources does not expand or otherwise alter ElecSuper's applicable warranties or warranty disclaimers for ElecSuper products.