

SuperMOS –SOT-523 60V BV_{DSS} , 1.8Ω $R_{DS(ON)}$, N-channel MOSFET

1. Description

The ES138KWR 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 ES138KWR is Pb-free.

2. Features

- 60V, $R_{DS(ON)}=1.8\Omega$ (Typ.) @ $V_{GS}=10V$
 $R_{DS(ON)}=2.0\Omega$ (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
- ESD Protection - HBM : 2kV

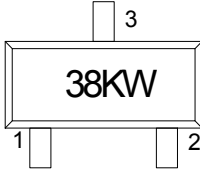
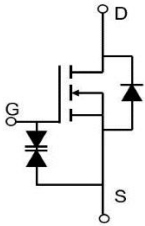
3. Applications

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

4. Ordering Information

Part Number	Package	Marking	Material	Packing	Quantity per Reel	Flammability Rating	Reel Sizes
ES138KW	SOT-523	38KW	Halogen free	Tape & Reel	3,000 PCS	UL 94V-0	7 inches

5. Pin Configuration and Functions

Pin	Function	Outline	Circuit Diagram
1	Gate		
2	Source		
3	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}	60	V
Gate-Source Voltage		V_{GS}	±20	V
Continuous Drain Current	$T_A=25^{\circ}\text{C}$	I_D	0.3	A
	$T_A=100^{\circ}\text{C}$		0.2	
Maximum Power Dissipation		P_D	0.35	W
Pulsed Drain Current		I_{DM}	1.2	A
Operating Junction Temperature		T_J	150	°C
Lead Temperature		T_L	260	°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 ($t \leq 10\text{s}$)	$R_{\theta JA}$		357	°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 =250uA	60			V
Zero Gate Voltage Drain Current	I _{DSS}	V _{DS} =60V, V _{GS} =0V			1	uA
Gate-to-source Leakage Current	I _{GSS}	V _{DS} =0V, V _{GS} =±20V			±10	uA
ON CHARACTERISTICS						
Gate Threshold Voltage	V _{GS(TH)}	V _{GS} =V _{DS} , I _D =250uA	0.7	1.1	1.5	V
Drain-to-source On-resistance	R _{DS(on)}	V _{GS} =10V, I _D =0.3A		1.8	2.2	Ω
		V _{GS} =4.5V, I _D =0.2A		2.0	3.0	
CHARGES, CAPACITANCES AND GATE RESISTANCE						
Input Capacitance	C _{ISS}	V _{GS} =0V, f=1MHz, V _{DS} =25V		15		pF
Output Capacitance	C _{OSS}			3.3		
Reverse Transfer Capacitance	C _{RSS}			1.3		
Total Gate Charge	Q _{G(TOT)}	V _{GS} =4.5V, V _{DS} =10V, I _D =0.3A		1.6		nC
Gate-to-Source Charge	Q _{GS}			0.2		
Gate-to-Drain Charge	Q _{GD}			0.5		
SWITCHING CHARACTERISTICS						
Turn-On Delay Time	t _{d(ON)}	V _{GS} =10V, V _{DS} =10V, I _D =0.2A, R _G =10Ω		2		ns
Rise Time	t _r			14		
Turn-Off Delay Time	t _{d(OFF)}			6		
Fall Time	t _f			19		
BODY DIODE CHARACTERISTICS						
Forward Voltage	V _{SD}	V _{GS} =0V, I _S =0.3A			1.5	V

7. Typical Characteristics

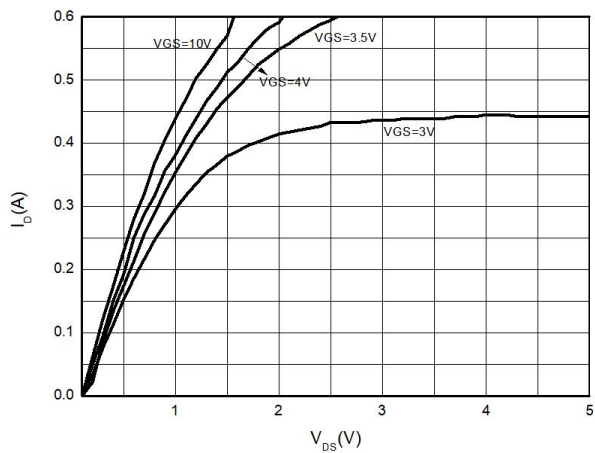


Figure1: Output Characteristics

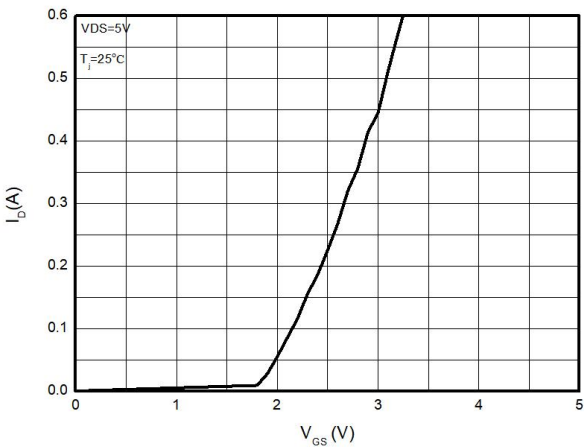


Figure2: Typical Transfer Characteristics

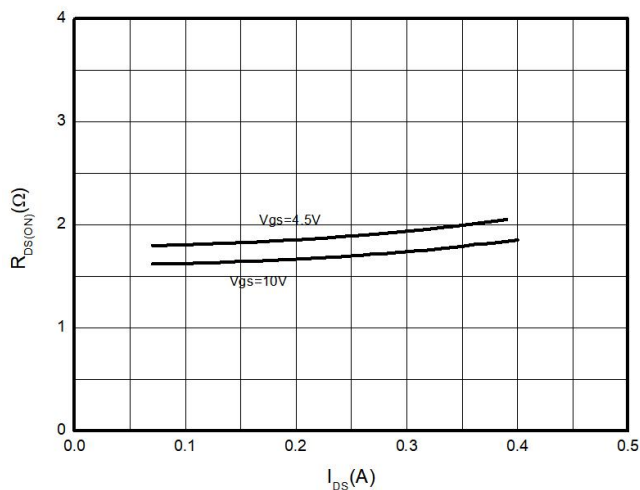


Figure3: on-Resistance vs. Drain Current

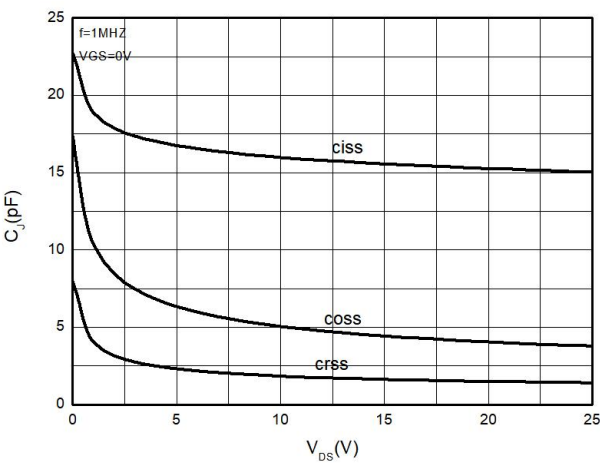


Figure4: Capacitance Characteristics

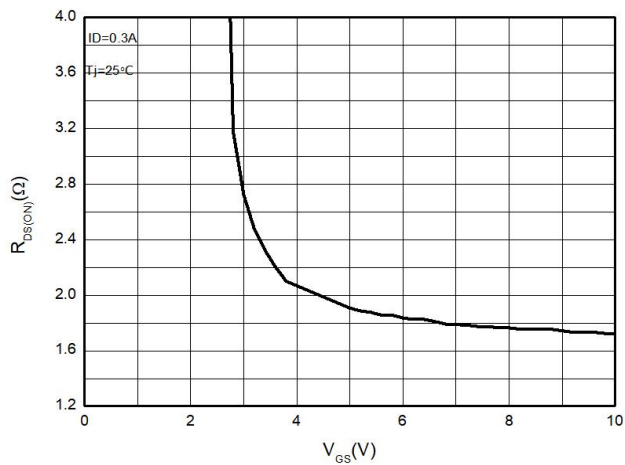


Figure5: on-Resistance vs. Gate to Source

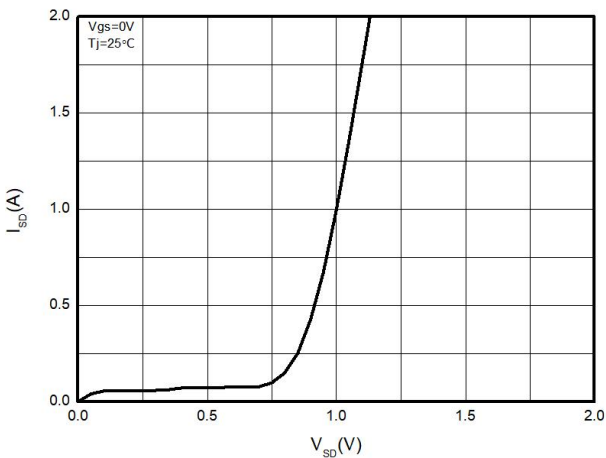
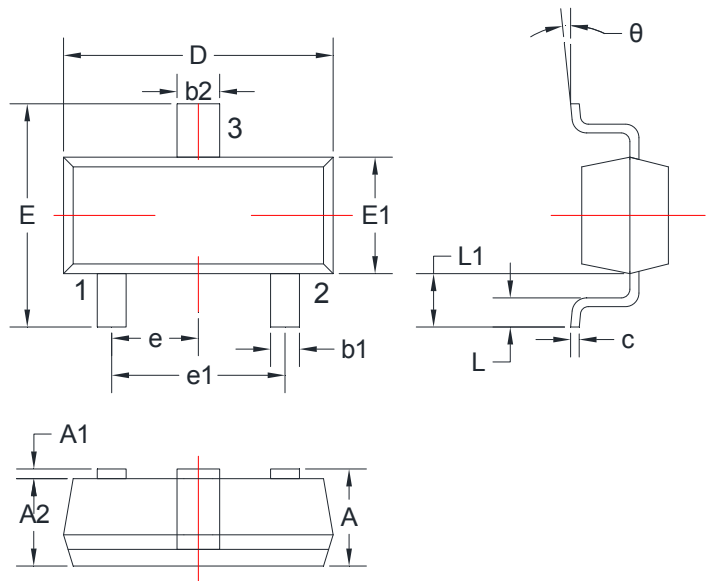


Figure6: Body Diode Characteristics

8.Dimension (SOT-523)



REF	Millimeters		REF	Millimeters	
	Min	Max		Min	Max
A	0.70	0.90	E	1.45	1.75
A1	0.00	0.10	E1	0.70	0.90
A2	0.70	0.80	e	0.50 TYP	
b1	0.15	0.25	e1	0.90	1.10
b2	0.25	0.35	L	0.26	0.46
c	0.10	0.20	L1	0.40 REF	
D	1.50	1.70	θ	0°	8°

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