

SuperMOS – TO-252 150V BV_{DSS}, 57mΩ R_{DS(ON)}, N-channel MOSFET

1. Description

The ESEP1520K 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 ESEP1520K is Pb-free.

2. Features

- 150V, R_{DS(ON)}=57mΩ(Tpy), V_{GS}=10V
R_{DS(ON)}=75mΩ(Tpy), V_{GS}=6V
 - Use trench MOSFET technology
 - High density cell design for low R_{DS(on)}
- Material : Halogen free
 - Reliable and rugged
 - Avalanche Rated
 - Low leakage current

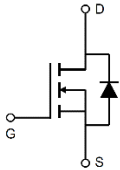
3. Applications

- 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
ESEP1520K	TO-252	ESD2544/lot	Halogen free	Tape & Reel	2,500 PCS	UL 94V-0	13 inches

5. Pin Configuration and Functions

Pin	Function	Outline	Circuit Diagram
1	Gate		
2	Drain		
3	Source		

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}	150	V
Gate-Source Voltage		V_{GS}	± 20	V
Continuous Drain Current	$T_C=25^{\circ}\text{C}$	I_D	19	A
	$T_C=75^{\circ}\text{C}$		14	
Maximum Power Dissipation	$T_C=25^{\circ}\text{C}$	P_D	62.5	W
	$T_C=75^{\circ}\text{C}$		37.5	
Pulsed Drain Current ^a		I_{DM}	45	A
Avalanche Current, Single Pulsed ^b		I_{AS}	15.5	A
Avalanche Energy, Single Pulsed ^b		E_{AS}	36	mJ
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	Maximum	Unit
Junction-to-Ambient Thermal Resistance	$t \leq 10 \text{ s}$	$R_{\theta JA}$		20	$^{\circ}\text{C/W}$
Junction-to-Case Thermal Resistance ^c	Steady State	$R_{\theta JC}$		2.0	

Note:

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

b: $T_J=25^{\circ}\text{C}$, $V_{DD}=150\text{V}$, $V_G=10\text{V}$, $L=0.3\text{mH}$, $R_g=25\Omega$

c: Device mounted on FR-4 substrate PC board, 2oz copper, with 1inch square copper plate.

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	150			V
Zero Gate Voltage Drain Current	I _{DSS}	V _{DS} =150V, V _{GS} =0V			1	uA
Gate-to-source Leakage Current	I _{GSS}	V _{DS} =0V, V _{GS} =±20V			±100	nA
ON CHARACTERISTICS						
Gate Threshold Voltage	V _{GS(TH)}	V _{GS} =V _{DS} , I _D =250uA	2.0	3.0	5.0	V
Drain-to-source On-resistance	R _{DS(on)}	V _{GS} =10V, I _D =5A		57	69	mΩ
		V _{GS} =6V, I _D =3A		75	100	
Forward Trans conductance	g _{FS}	V _{DS} =5.0V, I _D =5A	1		40	S
CHARGES, CAPACITANCES AND GATE RESISTANCE						
Input Capacitance	C _{ISS}	V _{GS} =0V, f=1MHz, V _{DS} =75V		675		pF
Output Capacitance	C _{OSS}			78		
Reverse Transfer Capacitance	C _{RSS}			4		
Total Gate Charge	Q _{G(TOT)}	V _{GS} =10V, V _{DS} =75V, I _D =5A		11.5	20	nC
Gate-to-Source Charge	Q _{GS}			2		
Gate-to-Drain Charge	Q _{GD}			2.5		
SWITCHING CHARACTERISTICS						
Turn-On Delay Time	t _{d(ON)}	V _{GS} =10V, V _{DS} =75V, R _L =15Ω, R _G =3Ω		6		ns
Rise Time	t _r			3		
Turn-Off Delay Time	t _{d(OFF)}			20		
Fall Time	t _f			5		
BODY DIODE CHARACTERISTICS						
Forward Voltage	V _{SD}	V _{GS} =0V, I _S =1.0A			1.5	V

7. Typical Characteristic

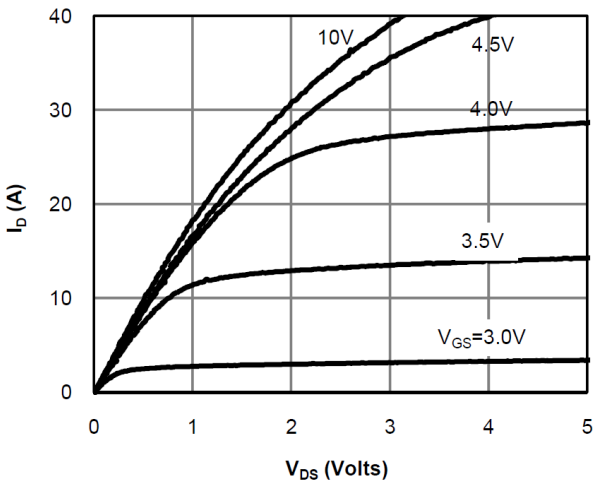


Figure 1: On-Region Characteristics (Note E)

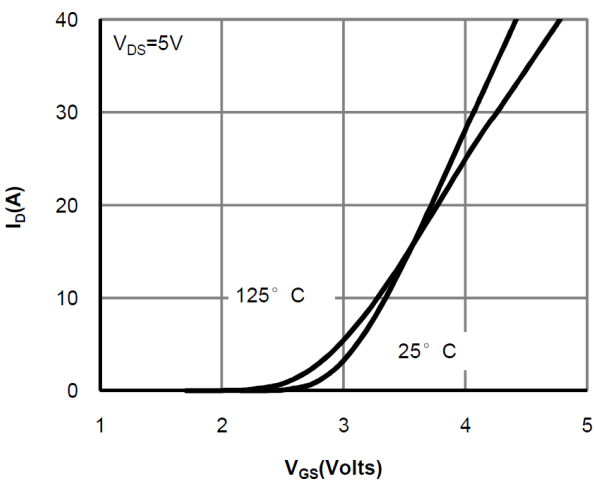


Figure 2: Transfer Characteristics (Note E)

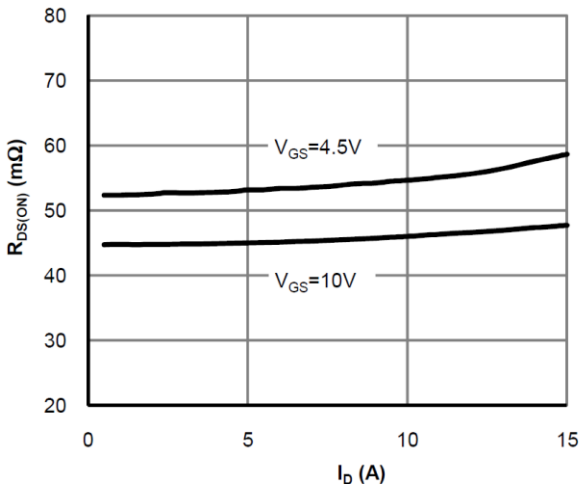


Figure 3: On-Resistance vs. Drain Current and Gate Voltage (Note E)

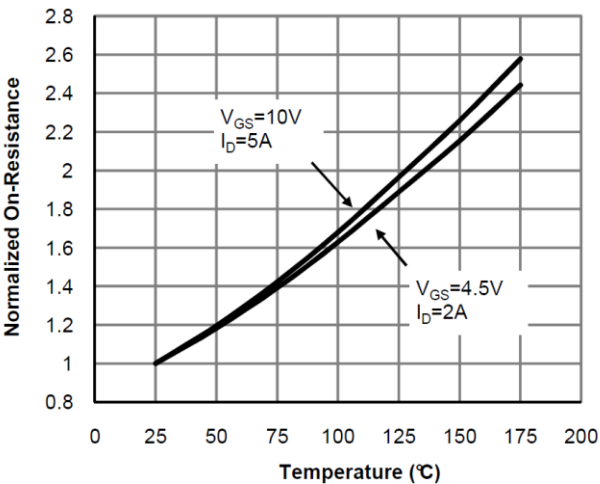


Figure 4: On-Resistance vs. Junction Temperature (Note E)

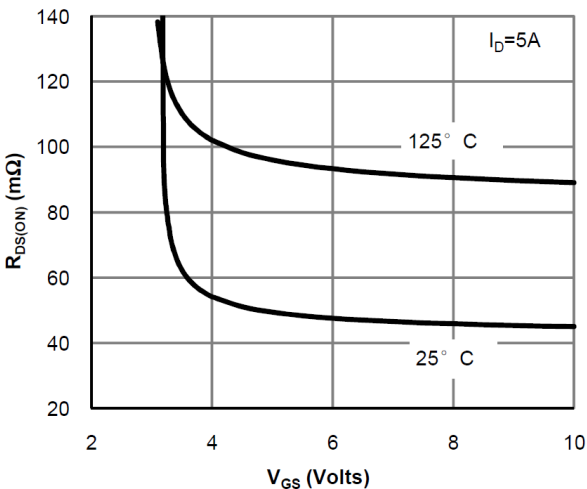


Figure 5: On-Resistance vs. Gate-Source Voltage (Note E)

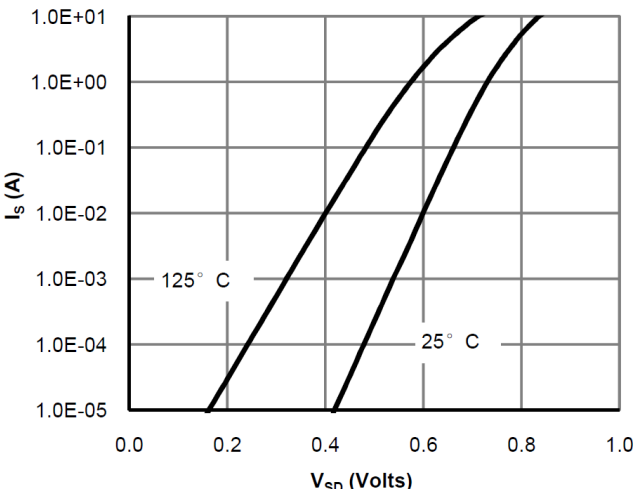
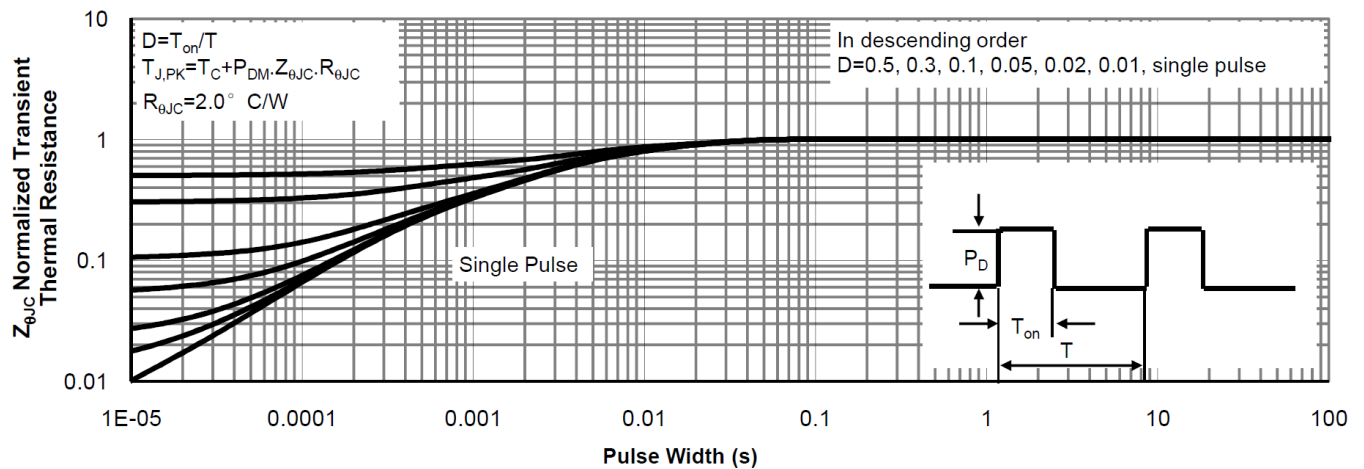
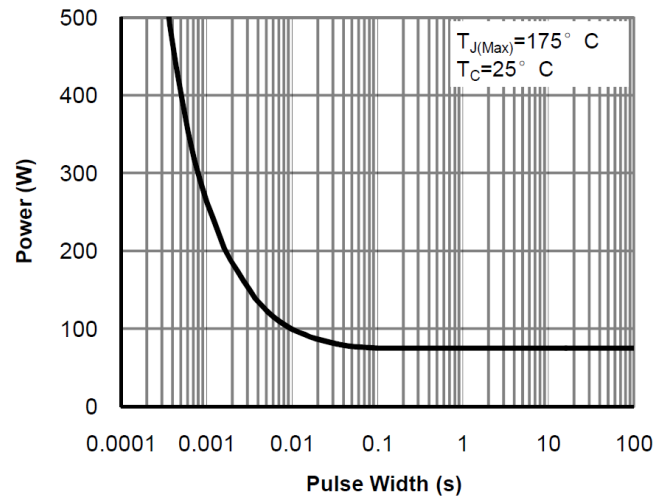
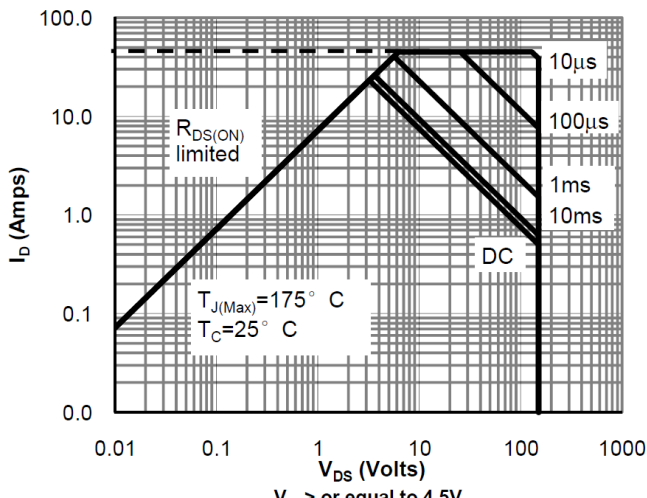
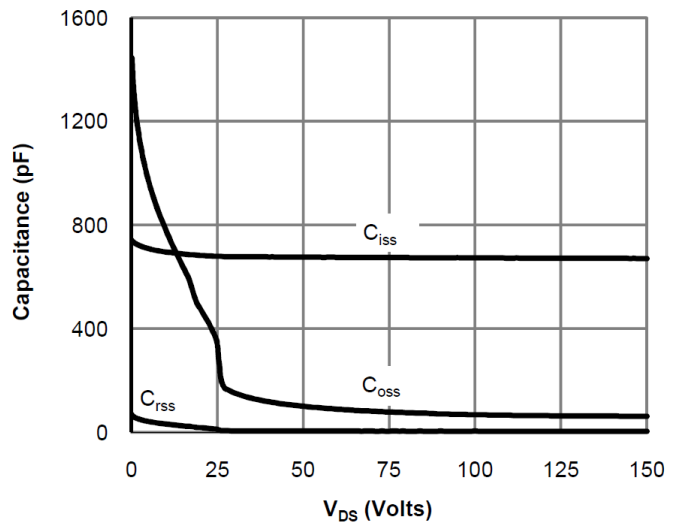
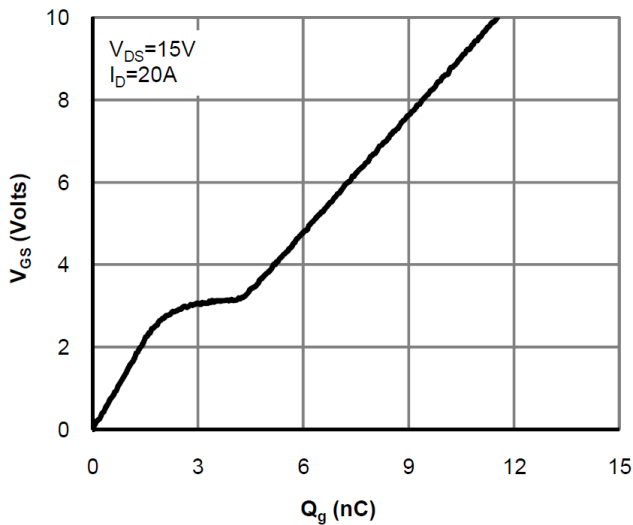
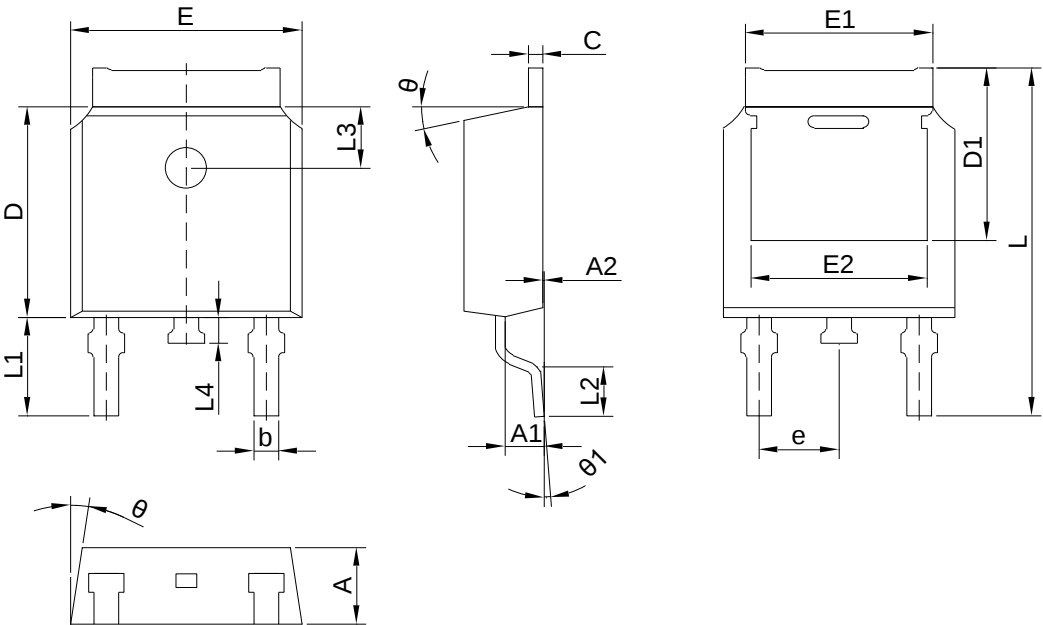


Figure 6: Body-Diode Characteristics (Note E)



8. Dimension (TO-252)



COMMON DIMENSIONS CUNITS MEASURE=MILLIMETER							
SYMBOL	MIN	TYP	MAX	SYMBOL	MIN	TYP	MAX
A	2.10	2.30	2.50	E2	4.63	4.83	5.03
A1	0.97	1.07	1.17	L	9.90	10.10	10.30
A2	0.00	-	0.12	L1	2.74	2.94	3.14
b	0.66	0.76	0.86	L2	1.40	1.50	1.70
C	0.45	0.51	0.60	L3	1.65	1.80	1.95
D	5.90	6.10	6.30	L4	0.60	0.80	1.00
D1	5.10	5.30	5.45	e	2.286 BSC		
E	6.40	6.60	6.80	θ	5°	7°	10°
E1	5.10	5.33	5.45	θ 1	0°	-	3°

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