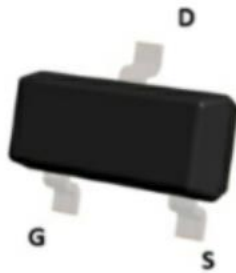
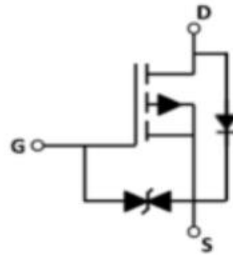
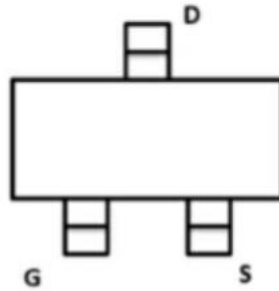


## P-Channel Enhancement Mode Field Effect Transistor



Top View

SOT-23



### Product Summary

- $V_{DS}$  -20V
- $I_D$  -5.6A
- $R_{DS(ON)}$  ( at  $V_{GS}=-4.5V$ ) <36 mohm
- $R_{DS(ON)}$  ( at  $V_{GS}=-2.5V$ ) <49 mohm
- $R_{DS(ON)}$  ( at  $V_{GS}=-1.8V$ ) <69 mohm
- ESD Protected Up to 2.0KV (HBM)

### General Description

- Trench Power LV MOSFET technology
- High Density Cell Design for Low  $R_{DS(ON)}$
- High Speed switching

### Applications

- Battery protection
- Load switch
- Power management

### ■ Absolute Maximum Ratings ( $T_A=25^\circ\text{C}$ unless otherwise noted)

Parameter	Symbol	Maximum	Unit
Drain-source Voltage	$V_{DS}$	-20	V
Gate-source Voltage	$V_{GS}$	$\pm 12$	V
Drain Current	$I_D$	$T_A=25^\circ\text{C}$ Steady State	-5.6
		$T_A=70^\circ\text{C}$ Steady State	-4.5
Pulsed Drain Current <sup>A</sup>	$I_{DM}$	-23	A
Total Power Dissipation @ $T_A=25^\circ\text{C}$ Steady State	$P_D$	1.3	W
Thermal Resistance Junction-to-Ambient @ Steady State <sup>B</sup>	$R_{\theta JA}$	96	$^\circ\text{C}/\text{W}$
Junction and Storage Temperature Range	$T_J, T_{STG}$	-55~+150	$^\circ\text{C}$

### ■ Ordering Information (Example)

PREFERRED P/N	PACKING CODE	Marking	MINIMUM PACKAGE(pcs)	INNER BOX QUANTITY(pcs)	OUTER CARTON QUANTITY(pcs)	DELIVERY MODE
LCE3415	F2	3415.	3000	30000	120000	7" reel

## ■ Electrical Characteristics ( $T_J=25^\circ\text{C}$ unless otherwise noted)

Parameter	Symbol	Conditions	Min	Typ	Max	Units
<b>Static Parameter</b>						
Drain-Source Breakdown Voltage	$BV_{DSS}$	$V_{GS}=0V, I_D=-250\mu A$	-20			V
Zero Gate Voltage Drain Current	$I_{DSS}$	$V_{DS}=-20V, V_{GS}=0V, T_C=25^\circ\text{C}$			-1	$\mu A$
Gate-Body Leakage Current	$I_{GSS}$	$V_{GS}=\pm 12V, V_{DS}=0V$		6	$\pm 15$	$\mu A$
		$V_{GS}=\pm 10V, V_{DS}=0V$		1.5	$\pm 5$	$\mu A$
		$V_{GS}=\pm 5V, V_{DS}=0V$		50	$\pm 200$	nA
Gate Threshold Voltage	$V_{GS(th)}$	$V_{DS}=V_{GS}, I_D=-250\mu A$	-0.35	-0.57	-1.0	V
Static Drain-Source On-Resistance	$R_{DS(ON)}$	$V_{GS}=-4.5V, I_D=-5.6A$		29	36	m $\Omega$
		$V_{GS}=-2.5V, I_D=-4.3A$		36	49	
		$V_{GS}=-1.8V, I_D=-3.0A$		49	69	
Diode Forward Voltage	$V_{SD}$	$I_S=-5.6A, V_{GS}=0V$		-0.8	-1.2	V
Maximum Body-Diode Continuous Current	$I_S$				-5.6	A
<b>Dynamic Parameters</b>						
Input Capacitance	$C_{iss}$	$V_{DS}=-10V, V_{GS}=0V, f=1\text{MHz}$		940		pF
Output Capacitance	$C_{oss}$			219		
Reverse Transfer Capacitance	$C_{rss}$			116		
<b>Switching Parameters</b>						
Total Gate Charge	$Q_g$	$V_{GS}=-4.5V, V_{DD}=-10V, I_D=-4A$		7.2		nC
Gate Source Charge	$Q_{gs}$			1.2		
Gate Drain Charge	$Q_{gd}$			1.6		
Turn-on Delay Time	$t_{D(on)}$	$V_{GS}=-4.5V, V_{DD}=-10V, R_L=2.5\Omega, R_{GEN}=3\Omega$		15		ns
Turn-on Rise Time	$t_r$			63		
Turn-off Delay Time	$t_{D(off)}$			21		
Turn-off Fall Time	$t_f$			12		

- A. Pulse Test: Pulse Width  $\leq 300\mu s$ , Duty cycle  $\leq 2\%$ .  
 B. Device mounted on FR-4 PCB, 1 inch x 0.85 inch x 0.062 inch.

■ Typical Performance Characteristics

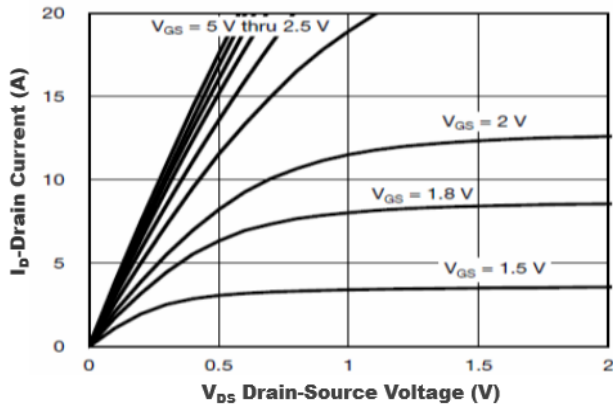


Figure1. Output Characteristics

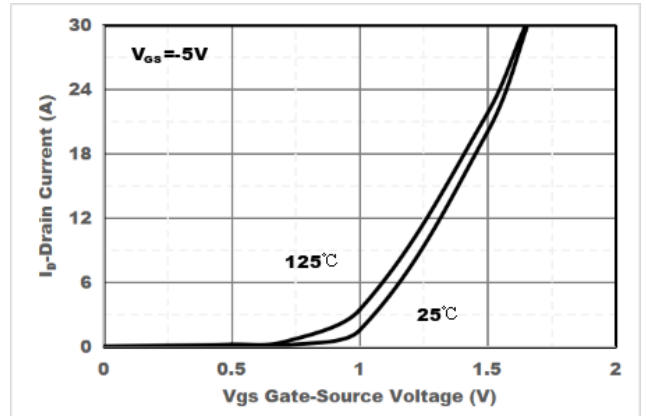


Figure2. Transfer Characteristics

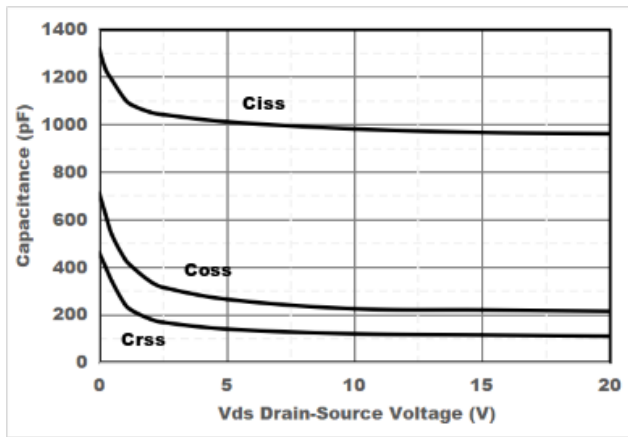


Figure3. Capacitance Characteristics

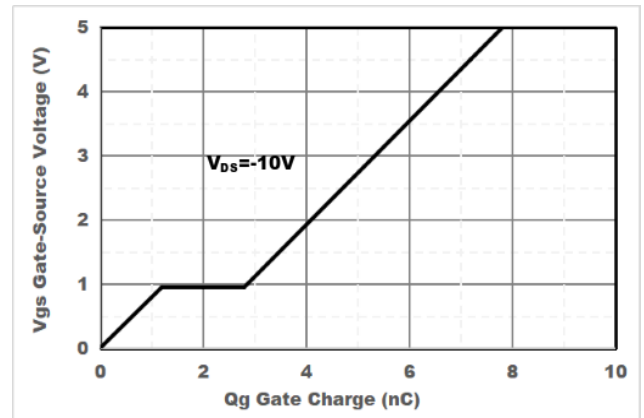


Figure4. Gate Charge

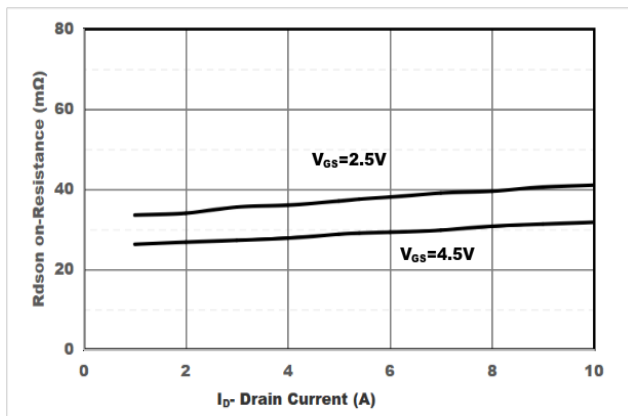


Figure5. Drain-Source on Resistance

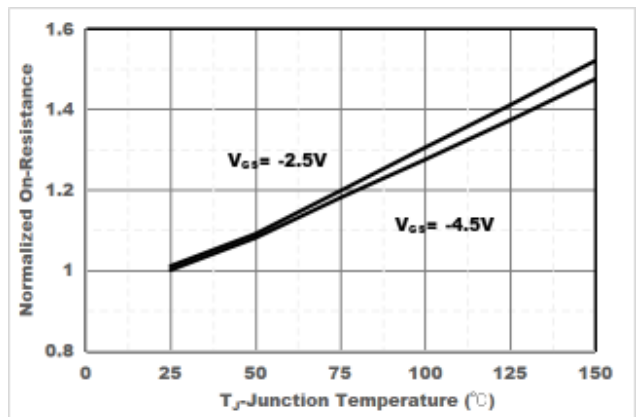


Figure6. Drain-Source on Resistance

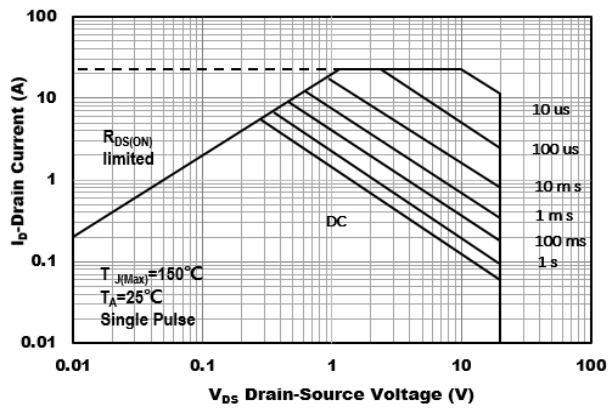


Figure7. Safe Operation Area

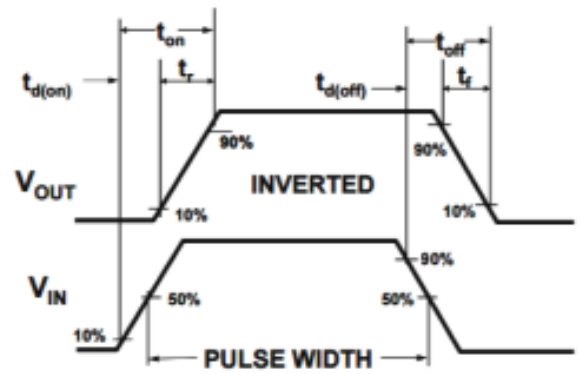
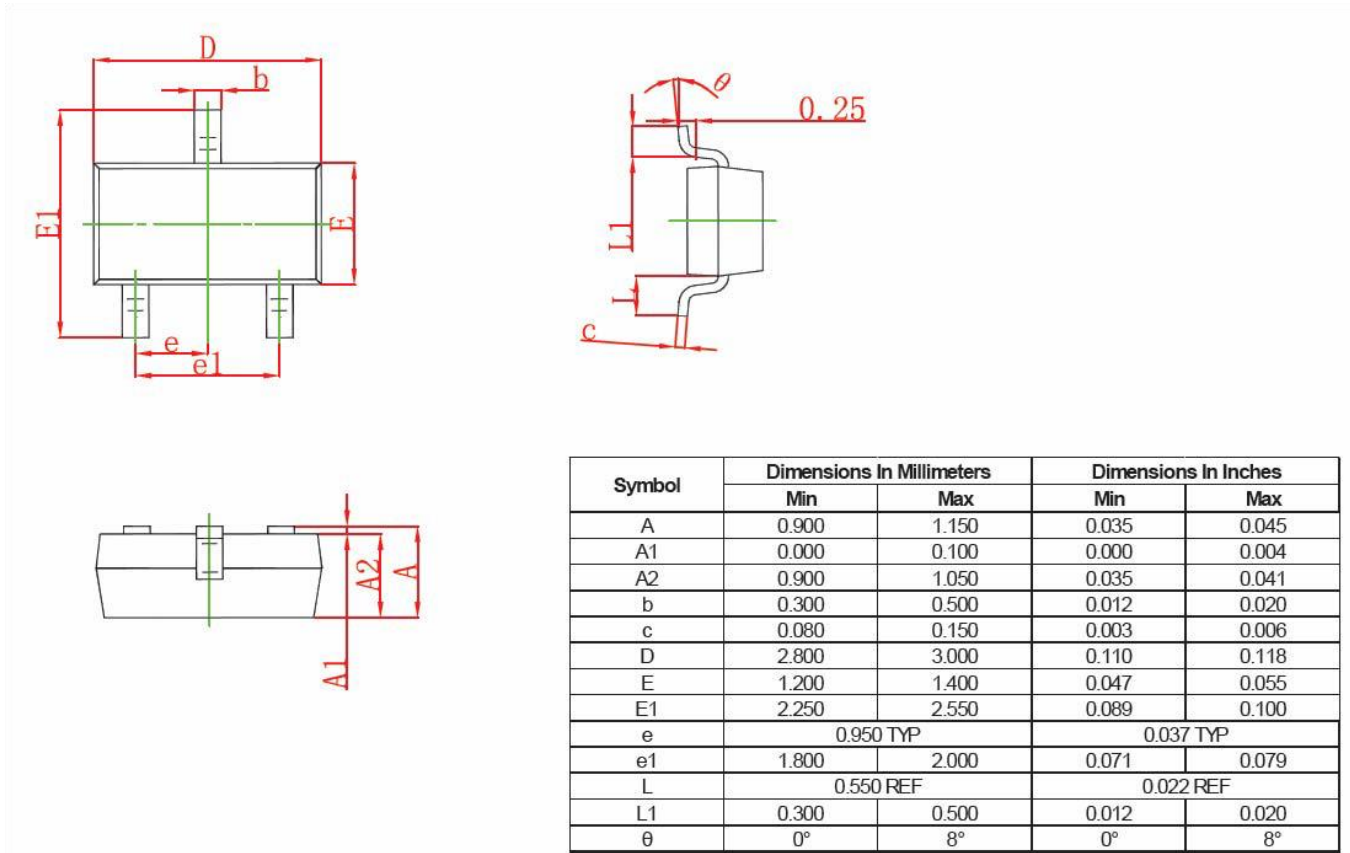


Figure8. Switching wave

## ■ SOT-23 Package information



## ■ SOT-23 Suggested Pad Layout

