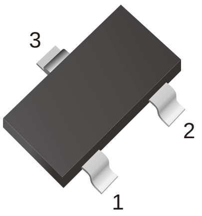
P-Channel Advanced Power Mosfet

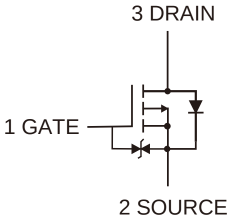
Features

- Low $R_{DS(on)}$ @V_{GS}=-4.5V
- -3.3V Logic Level Control
- P-Channel SOT23 Package
- HMB ESD Protection 4KV
- Lead free in comply with EU RoHS 2011/65/EU directives



Applications

- Load Switch
- Switching circuits
- High-speed line driver
- Power Management Functions



Product Summary

$V_{(BR)DSS}$	$R_{DS(ON)}$ Typ	I_D Max
-20V	38mΩ @-4.5V	-4.8A
	43mΩ @ -3.3V	

Ordering Information

Part Number	Marking	Shipping	Reel
LTM3415E-TR3	3415E	3000PCS Tape&Reel	7 inchs
LTM3415E-TR12	3415E	12000PCS Tape&Reel	13 inchs

Maximum Ratings and Thermal Characteristics (Ta=25°C unless otherwise noted)

Stresses exceeding Maximum Ratings may damage the device. Maximum Ratings are stress ratings only. Functional operation above the Recommended Operating Conditions is not implied. Extended exposure to stresses above the Recommended Operating Conditions may affect device reliability.

Symbol	Parameter		Rating	Unit
Common Ratings (T_A=25°C Unless Otherwise Noted)				
V_{GS}	Gate-Source Voltage		±8	V
$V_{(BR)DSS}$	Drain-Source Breakdown Voltage		-20	V
T_J	Maximum Junction Temperature		150	°C
T_{STG}	Storage Temperature Range		-50 to 150	°C
Mounted on Large Heat Sink				
I_{DM}	Pulse Drain Current Tested①	T_A =25°C	-30	A
I_D	Continuous Drain Current	T_A =25°C	-4.8	A
		T_A =70°C	-3.6	
P_D	Maximum Power Dissipation	T_A =25°C	1.5	W
		T_A =70°C	1.0	
$R_{\theta JA}$	Thermal Resistance Junction-Ambient		80	°C/W

Electrical Characteristics (Ta=25°C unless otherwise specified)

Symbol	Parameter	Condition	Min	Typ	Max	Unit
Static Electrical Characteristics @ T_J = 25°C (unless otherwise stated)						
$V_{(BR)DSS}$	Drain-Source Breakdown Voltage	V_{GS}=0V I_D=-250μA	-20			V
I_{DSS}	Zero Gate Voltage Drain Current(T_A=25℃)	V_{DS}=-20V, V_{GS}=0V			-1	μA
	Zero Gate Voltage Drain Current(T_A=125℃)	V_{DS}=-16V, V_{GS}=0V			-100	μA
I_{GSS}	Gate-Body Leakage Current	V_{GS}=±8V, V_{DS}=0V			±10	μA
$V_{GS(TH)}$	Gate Threshold Voltage	V_{DS}=V_{GS}, I_D=-250μA	-0.4	-0.7	-1.2	V
$R_{DS(ON)}$	Drain-Source On-State Resistance②	V_{GS}=-4.5V, I_D=-4A		38	45	mΩ
$R_{DS(ON)}$	Drain-Source On-State Resistance②	V_{GS}=-3.3V, I_D=-3A		43	55	mΩ
$R_{DS(ON)}$	Drain-Source On-State Resistance②	V_{GS}=-2.5V, I_D=-2A		52	65	mΩ
Dynamic Electrical Characteristics @ T_J = 25°C (unless otherwise stated)						
C_{iss}	Input Capacitance	V_{DS}=-10V, V_{GS}=0V, f=1MHz		675		pF
C_{oss}	Output Capacitance			120		pF
C_{rss}	Reverse Transfer Capacitance			85		pF
Q_g	Total Gate Charge	V_{DS}=-10V I_D=-4A, V_{GS}=-4.5V		14.2		nC
Q_{gs}	Gate Source Charge			3.2		nC
Q_{gd}	Gate Drain Charge			5.8		nC
Switching Characteristics						
$t_{d(on)}$	Turn on Delay Time	V_{DD}=-10V, I_D=-2A, R_G=3.3Ω, V_{GS}=-4.5V		15		ns
t_r	Turn on Rise Time			11		ns
$t_{d(off)}$	Turn Off Delay Time			22		ns
t_f	Turn Off Fall Time			35		ns
Source Drain Diode Characteristics						
I_{SD}	Source drain current(Body Diode)	T_A=25℃			-2	A
V_{SD}	Forward on voltage②	T_j=25℃, I_{SD}=-2A, V_{GS}=0V		-0.83	-1.2	V

Notes:

① Pulse width limited by maximum allowable junction temperature

②Pulse test ; Pulse width≤300μs, duty cycle≤2%.

Characteristic Curves

Fig1. Typical Output Characteristics

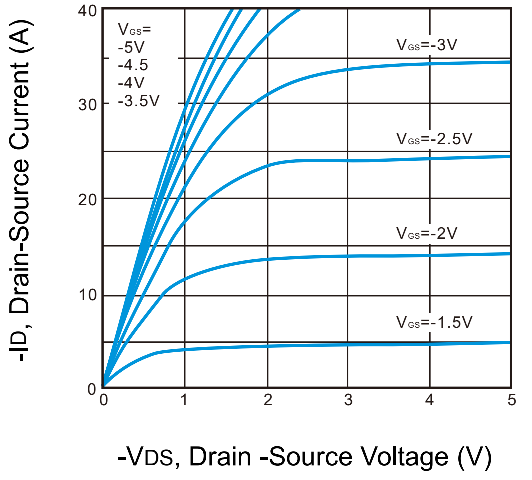


Fig2. Normalized Threshold Voltage Vs Temperature

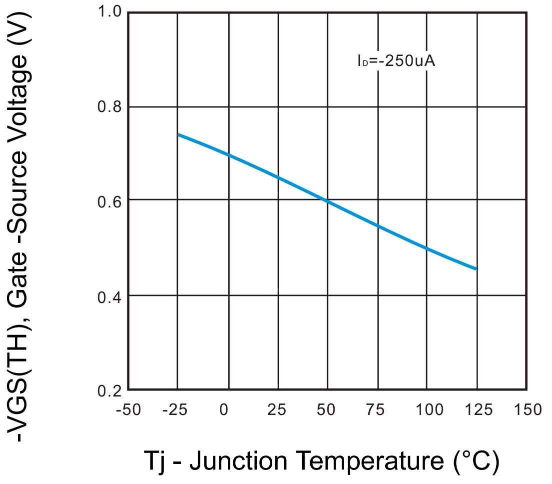


Fig3. Typical Transfer Characteristics

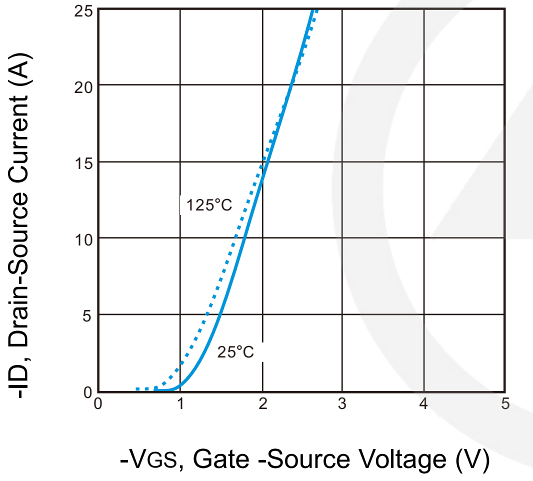


Fig4. Drain -Source Voltage vs Gate -Source Voltage

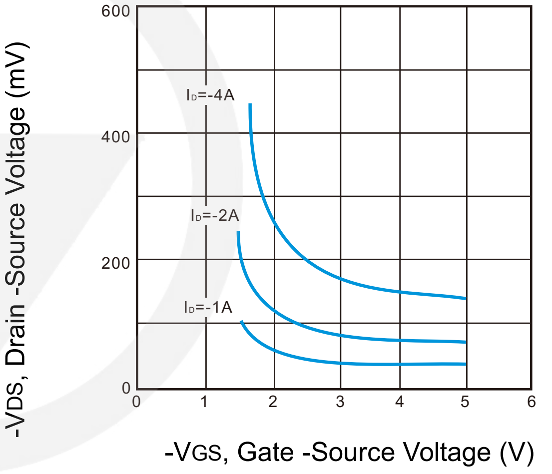


Fig5. Typical Source-Drain Diode Forward Voltage

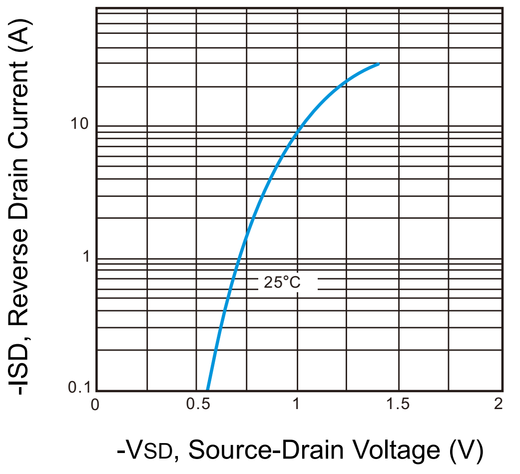
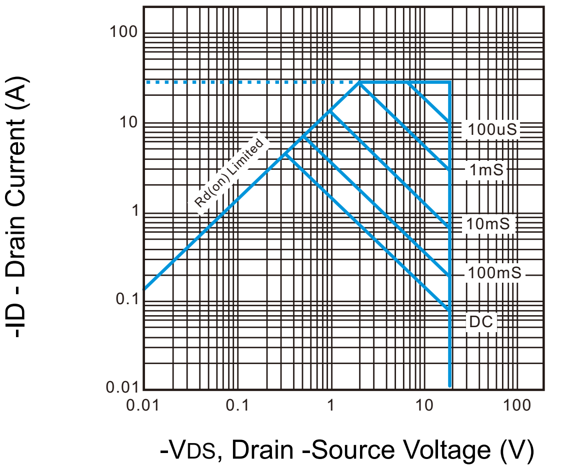


Fig6. Maximum Safe Operating Area



Characteristic Curves

Fig7. Typical Capacitance Vs Drain-Source Voltage

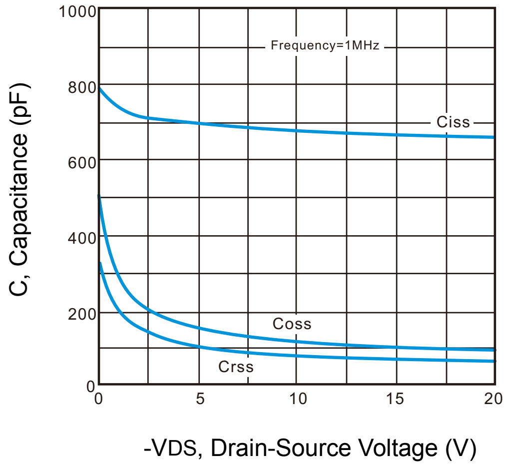


Fig8. Typical Gate Charge Vs Gate-Source Voltage

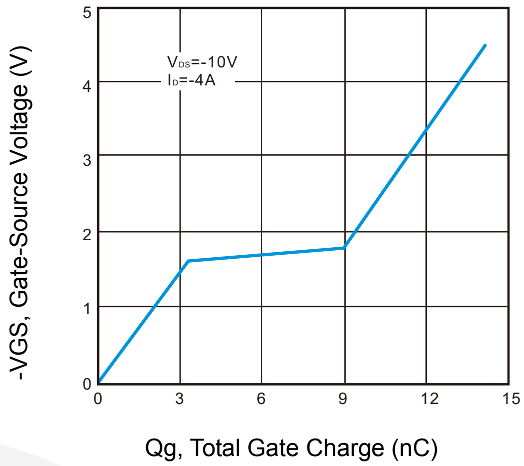


Fig9. Normalized Maximum Transient Thermal Impedance

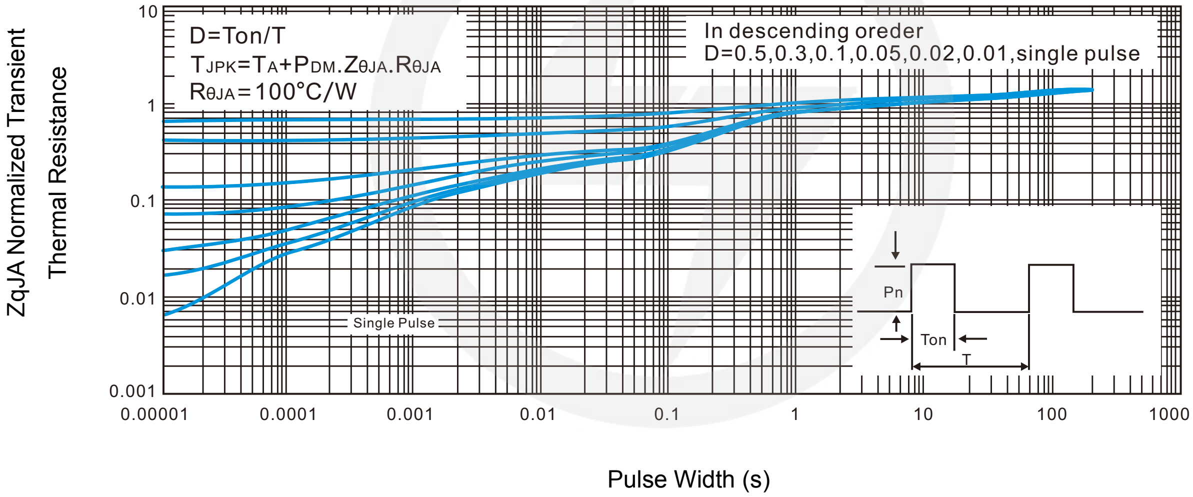
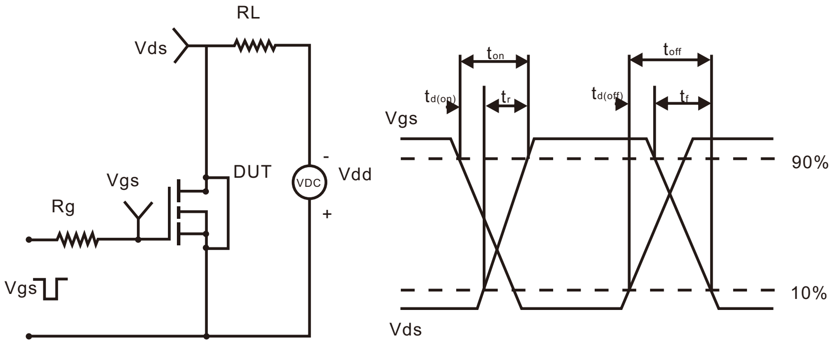
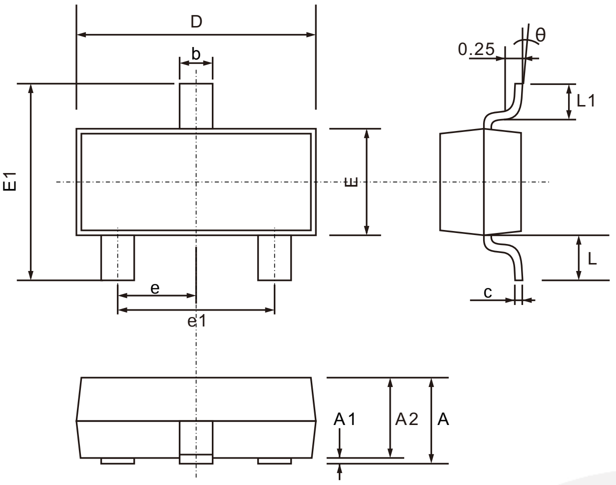


Fig10. Switching Time Test Circuit and waveforms



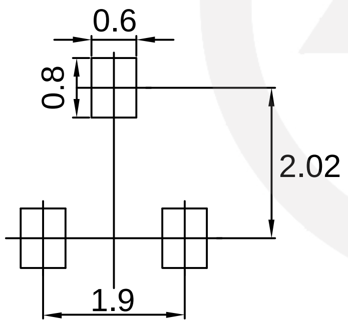
SOT-23 Package Outline



Unit: mm

SYMBOL	DIMENSIONS	
	MIN.	MAX.
A	0.900	1.200
A1	0.000	0.100
A2	0.900	1.050
b	0.300	0.500
c	0.080	0.200
D	2.700	3.100
E	1.200	1.400
E1	2.200	2.600
e	0.950 TYP.	
e1	1.750	2.050
L	0.550 TYP.	
L1	0.300	0.500
θ	0°	8°

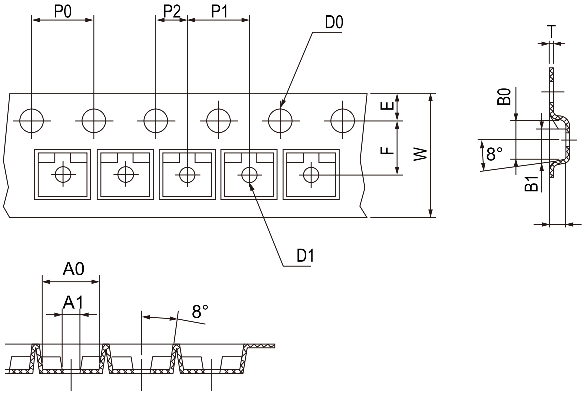
SOT-23 Suggested Pad Layout



Note:
1.Controlling dimension:in millimeters.
2.General tolerance:± 0.05mm
3.The pad layout is for reference purpose only.

Carrier Tape Dimensions

Unit：mm

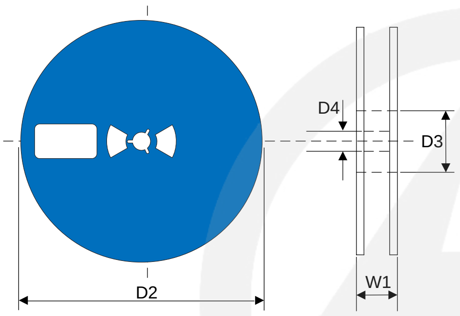


Symbol	Spec	Symbol	Spec
A0	3.15±0.10	P0	4.00±0.05
A1	1.09±0.10	P1	4.00±0.02
B0	2.77±0.10	W	8.00±0.10
B1	2.15±0.10	E	1.75±0.10
K0	1.22±0.10	F	3.50±0.05
D0	1.50±0.10	T	2.00±0.10
D1	1.00±0.10		

Reel Dimensions

Unit：mm

7” Reel

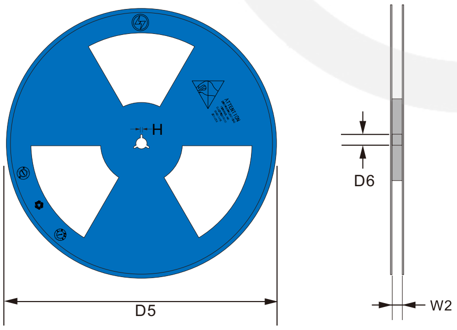


D2	Φ178.0±2.0
D3	Φ50
D4	13.0±0.5
W1	12±0.5
Quantity: 3000PCS	

Reel Dimensions

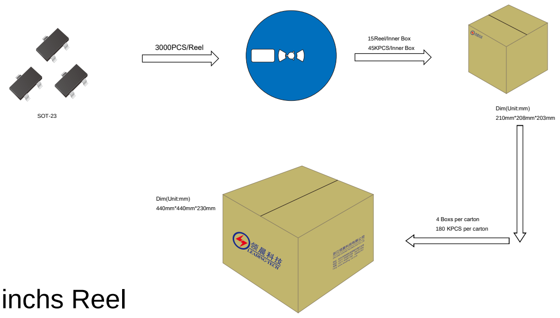
Unit：mm

13” Reel

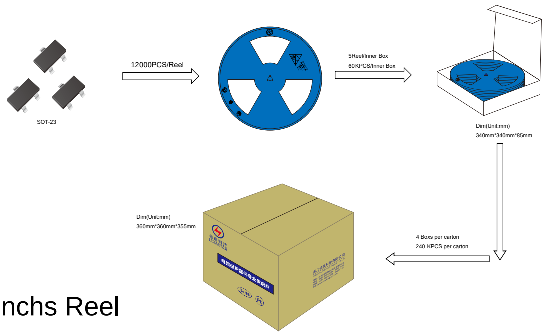


D5	Φ330.0±2.0
D6	Φ13.5±0.5
H	2.5±1.0
W2	12±2.0
Quantity: 12000PCS	

Packaging



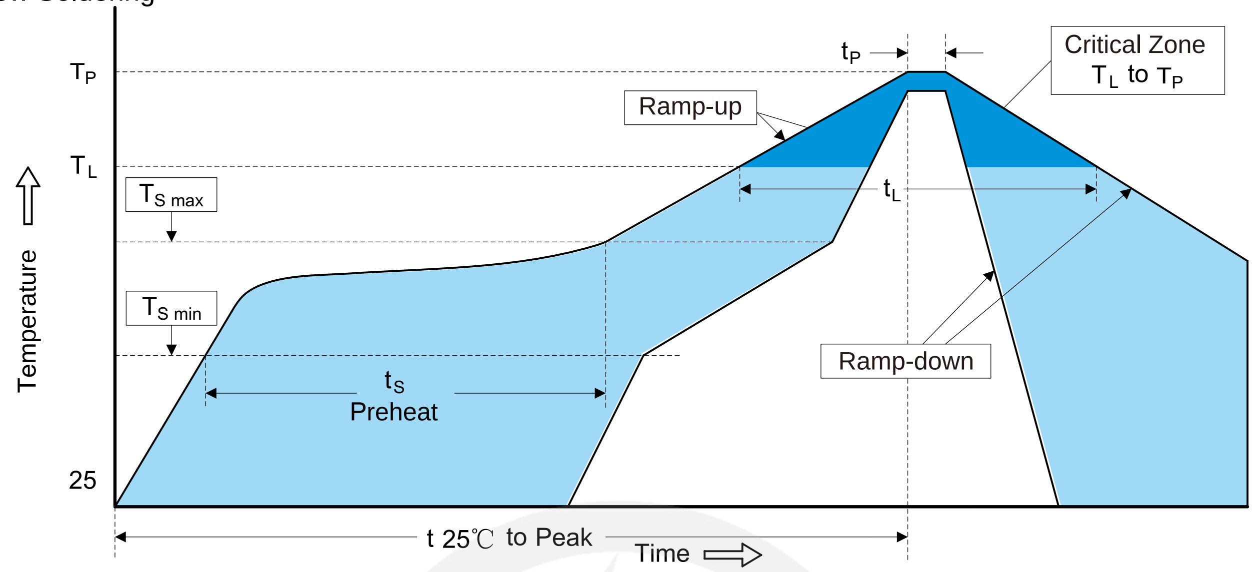
7 inchs Reel



13 inchs Reel

Recommended Soldering Conditions

Reflow Soldering



Recommended Conditions

Profile Feature	Pb-Free Assembly
Average ramp-up rate (T$_L$ to T$_P$)	3℃/second max.
Preheat -Temperature Min (T$_{S\ min}$) -Temperature Max (T$_{S\ max}$) -Time (min to max) (t$_S$)	 150℃ 200℃ 60-180 seconds
T$_{S\ max}$ to T$_L$ -Ramp-up Rate	 3℃/second max.
Time maintained above: -Temperature (T$_L$) -Time (t$_L$)	 217℃ 60-150 seconds
Peak Temperature (T$_P$)	260℃
Time within 5℃ of actual Peak Temperature (t$_P$)	20-40 seconds
Ramp-down Rate	6℃/second max.
Time 25℃ to Peak Temperature	8 minutes max.

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Version Update Information

Series NO.	Enactment/Revision Date	Effective Date	Version	Revision Content	Revision Reason	Revision Person	Note
01	2024.03.20	2024.03.20	3.0	New file	/	Ding	
02	2025.06.16	2025.06.16	3.1	Update packaging information	/	Ding	
03	2026.03.05	2026.03.05	3.2	Package outline E1(max)=2.6mm	/	Ding	