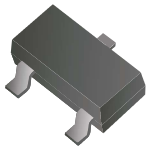
LM2302A

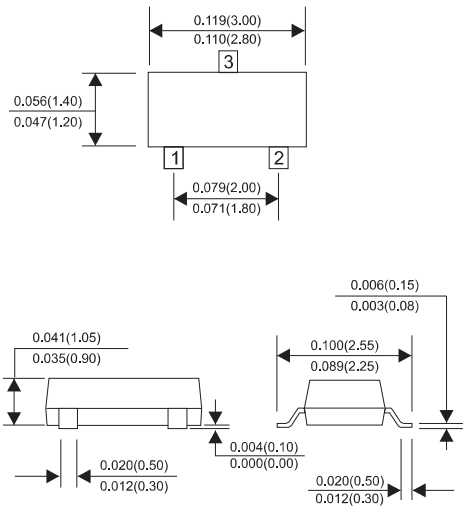
N-Channel MOSFET

RoHS Device
Halogen Free



$V_{(BR)DSS}$	$R_{DS(on)}$MAX	I_D
20V	50mΩ @ 4.5V	3A
	80mΩ @ 2.5V	

SOT-23



Dimensions in inches and (millimeter)

Features

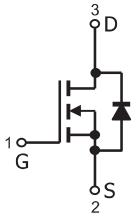
- High power and current handling capability.
- Lead free product is acquired.
- Surface mount package.

Mechanical data

- Case: SOT-23, molded plastic.
- Mounting position: Any.

Circuit Diagram

G : Gate
S : Source
D : Drain



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

Parameter	Symbol	Limit	Unit
Drain-source voltage	V_{DS}	20	V
Gate-source voltage	V_{GS}	±12	V
Drain current-continuous	I_D	3	A
Drain current-pulsed (Note 1)	I_{DM}	12	A
Maximum power dissipation	P_D	0.8	W
Operating junction and storage temperature range	T_J, T_{STG}	-55 to 150	°C

Thermal Characteristic

Thermal resistance, junction to ambient (Note 2)	$R_{\theta JA}$	156	°C/W

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

Parameter	Symbol	Condition	Min	Typ	Max	Unit
Off Characteristics						
Drain-source breakdown voltage	BV_{DSS}	V_{GS} = 0V, I_D = 250μA	20	22		V
Zero gate voltage drain current	I_{DSS}	V_{DS} = 20V, V_{GS} = 0V			1	μA
Gate-body leakage current	I_{GSS}	V_{GS} = ±12V, V_{DS} = 0V			±100	nA
On Characteristics (Note 3)						
Gate threshold voltage	$V_{GS(th)}$	V_{DS} = V_{GS}, I_D = 250μA	0.5	0.75	1.2	V
Drain-source on-state resistance	$R_{DS(ON)}$	V_{GS} = 4.5V, I_D = 3A		35	50	mΩ
		V_{GS} = 2.5V, I_D = 2.8A		42	80	
Forward transconductance	g_{FS}	V_{DS} = 5V, I_D = 3A		5		S
Dynamic Characteristics (Note 4)						
Input capacitance	C_{iss}	V_{DS} = 10V, V_{GS} = 0, f = 1MHz		255		pF
Output capacitance	C_{oss}			45		
Reverse transfer capacitance	C_{rss}			35		
Switching Characteristics (Note 4)						
Turn-on delay time	$t_{d(on)}$	V_{DD} = 10V, R_L = 3.3Ω, V_{GS} = 4.5V, R_{GEN} = 6Ω		2.3		nS
Turn-on rise time	t_r			3.1		
Turn-off delay time	$t_{d(off)}$			20		
Turn-off fall time	t_f			2.5		
Total gate charge	Q_g	V_{DS} = 10V, I_D = 3A, V_{GS} = 4.5V		2.7		nC
Gate-source charge	Q_{gs}			0.4		
Gate-drain charge	Q_{gd}			0.5		
Drain-Source Diode Characteristics						
Diode forward voltage (Note 3)	V_{SD}	V_{GS} = 0V, I_S = 3A			1.2	V
Diode forward current (Note 2)	I_S				3	A

Notes: 1. Repetitive rating: Pulse width limited by maximum junction temperature.
2. Surface mounted on FR4 board, t ≤ 10 sec.
3. Pulse test: Pulse width ≤ 300μs, duty cycle ≤ 2% .
4. Guaranteed by design, not subject to production.

Typical Electrical and Thermal Characteristics

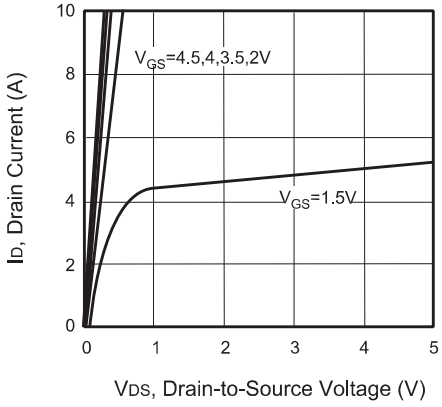


Figure 1. Output Characteristics

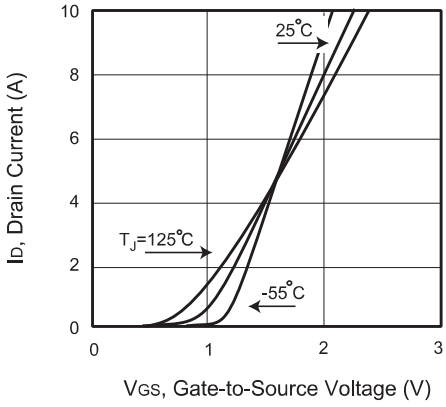


Figure 2. Transfer Characteristics

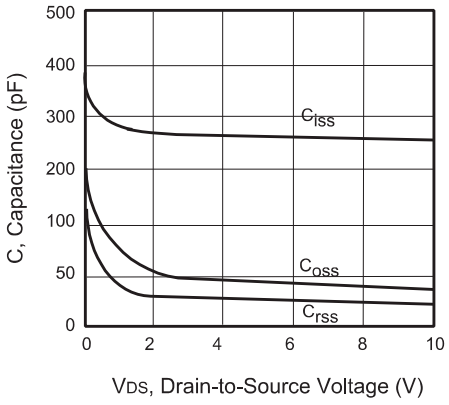


Figure 3. Capacitance

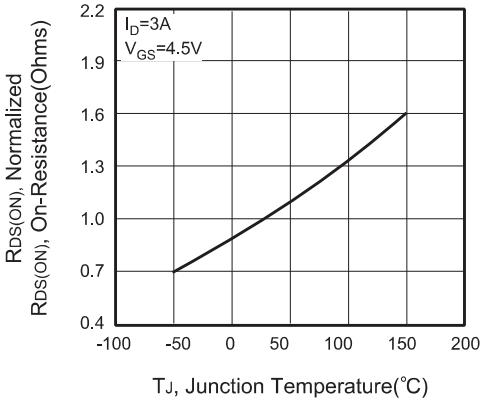


Figure 4. On-Resistance Variation with Temperature

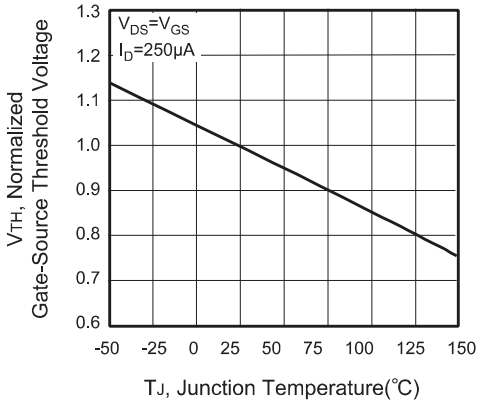


Figure 5. Gate Threshold Variation with Temperature

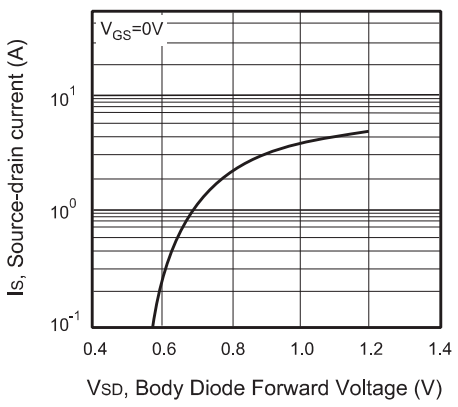


Figure 6. Body Diode Forward Voltage Variation with Source Current

Typical Electrical and Thermal Characteristics

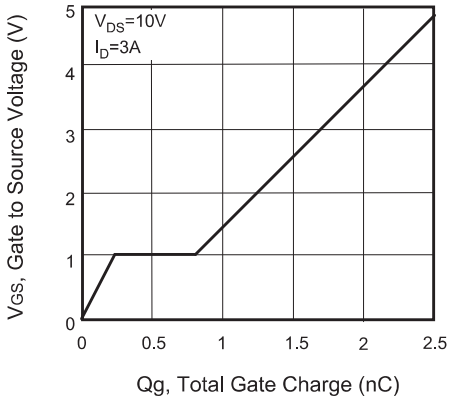


Figure 7. Gate Charge

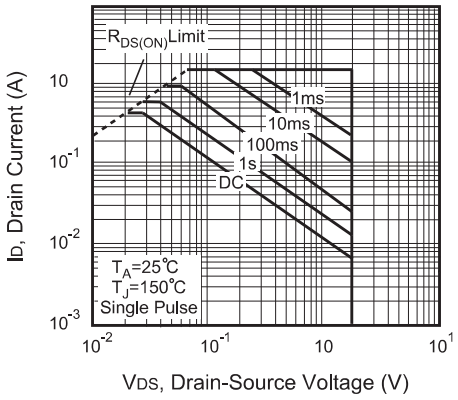


Figure 8. Maximum Safe Operating Area

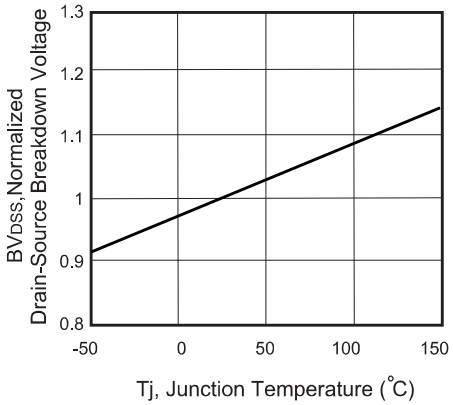


Figure 9. Breakdown Voltage Variation VS Temperature

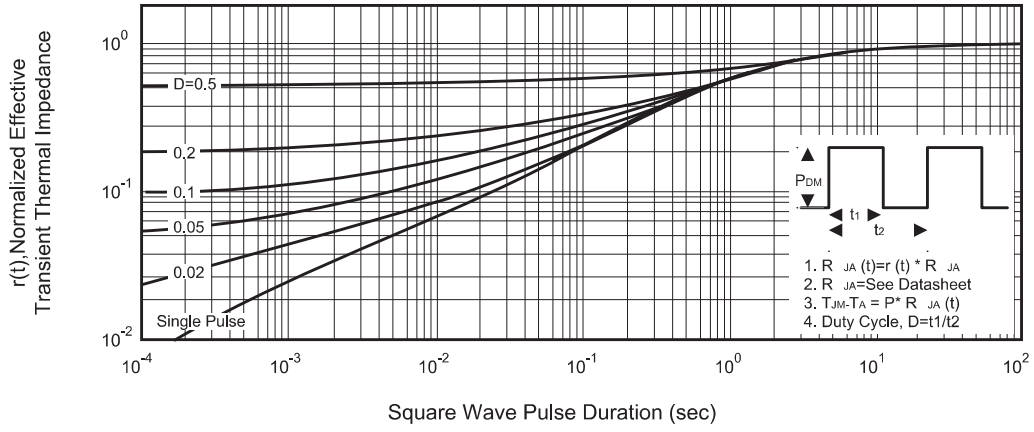


Figure 10. Normalized Thermal Transient Impedance Curve

Figure A: Gate Charge Test Circuit and Waveform

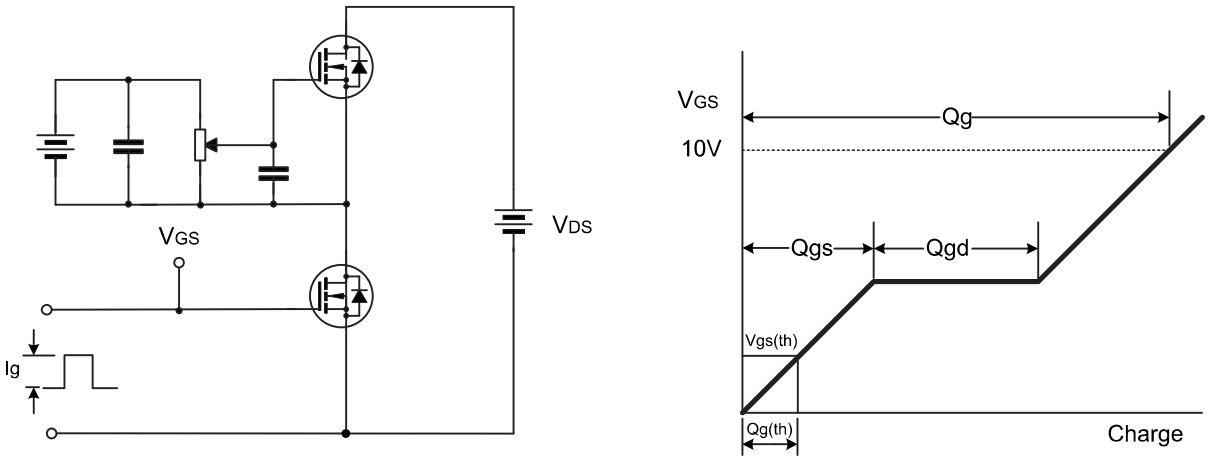


Figure B: Resistve Switching Test Circuit and Waveform

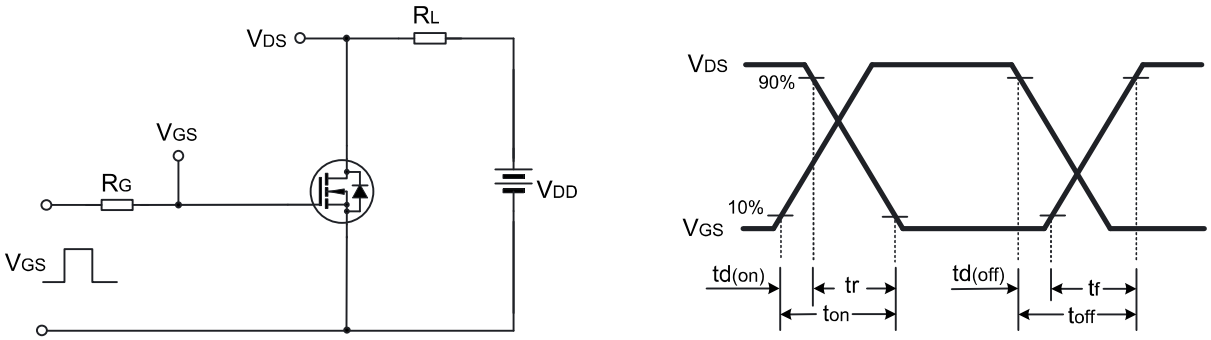
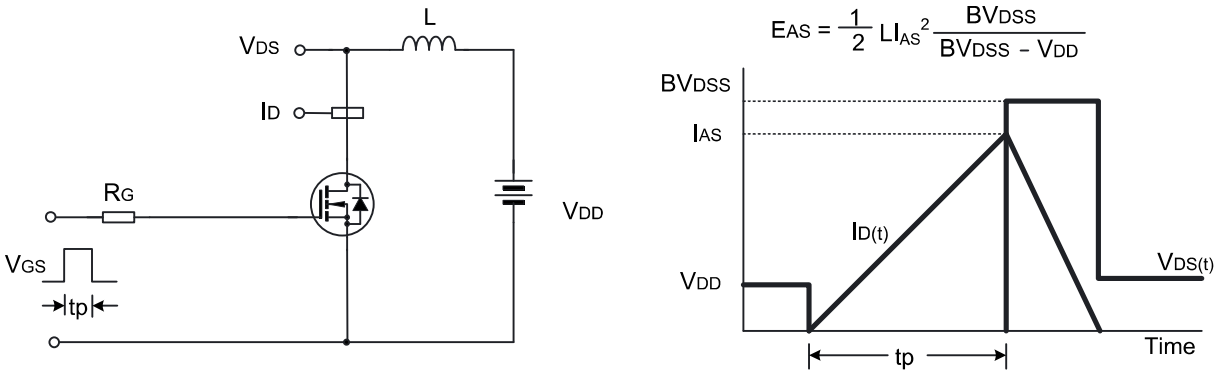
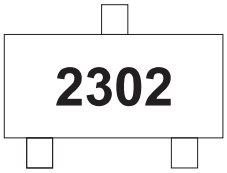


Figure C: Unclamped Inductive Switching Test Circuit and Waveform



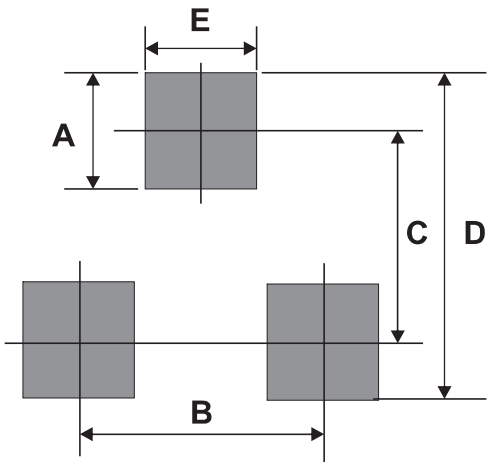
Marking Code

Part Number	Marking Code
LM2302A	2302



Suggested P.C.B. PAD Layout

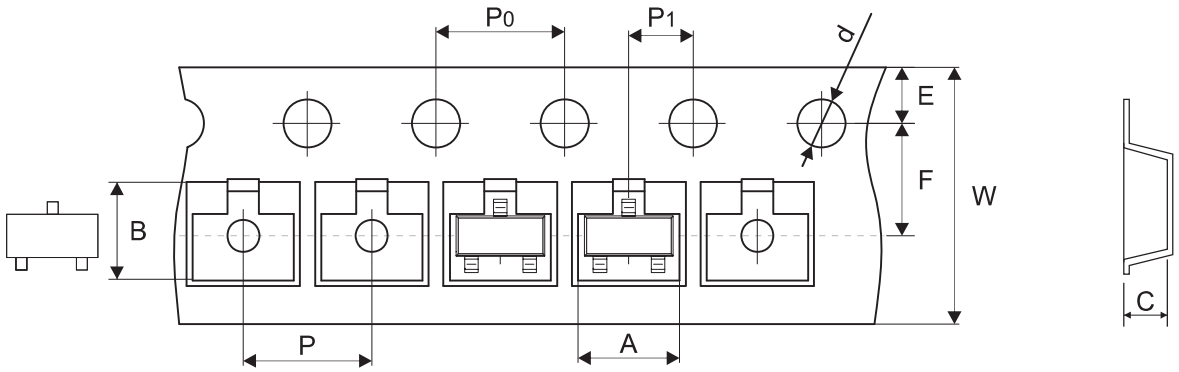
SIZE	SOT-23	
	(mm)	(inch)
A	0.80	0.031
B	1.90	0.075
C	2.02	0.080
D	2.82	0.111
E	0.60	0.024

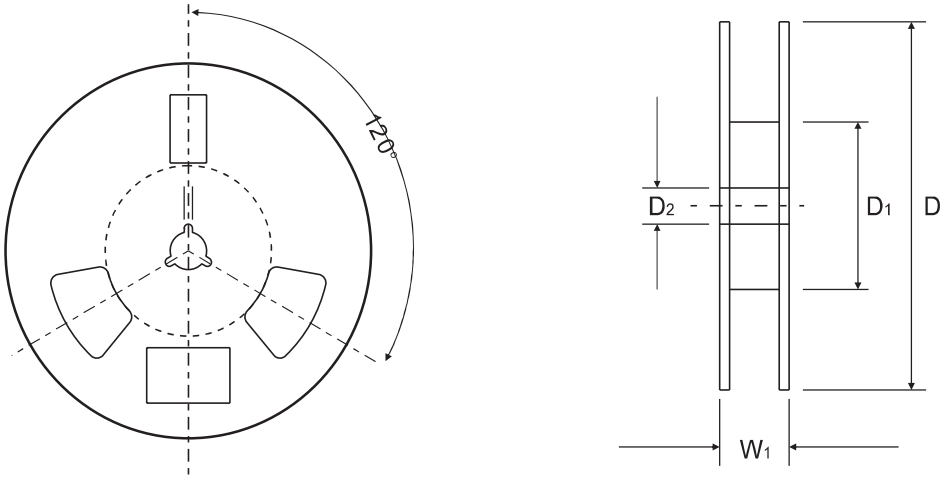


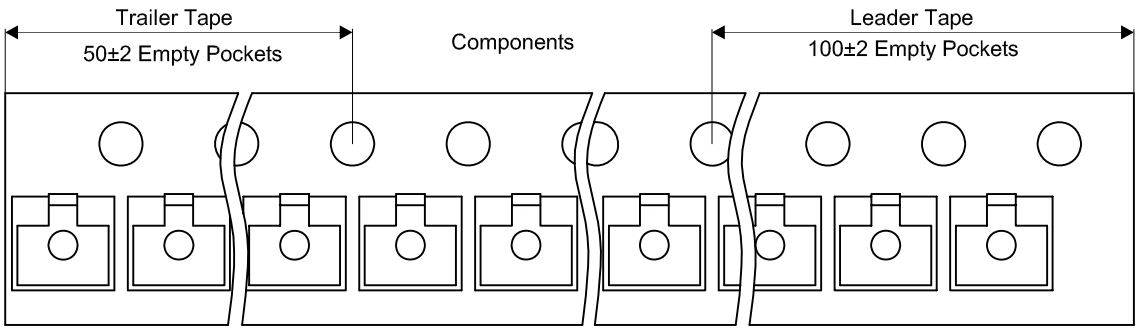
Standard Packaging

Case Type	REEL PACK	
	REEL (pcs)	Reel Size (inch)
SOT-23	3,000	7

Reel Taping Specification







	SYMBOL	A	B	C	d	D	D1	D2
SOT-23	(mm)	3.15 ± 0.10	2.77 ± 0.10	1.22 ± 0.10	1.50 + 0.10 − 0.00	178.00 ± 1.00	54.60 ± 1.00	13.30 ± 1.00
	(inch)	0.124 ± 0.004	0.109 ± 0.004	0.048 ± 0.004	0.059 + 0.004 − 0.000	7.008 ± 0.039	2.150 ± 0.039	0.524 ± 0.039

	SYMBOL	E	F	P	P0	P1	W	W1
SOT-23	(mm)	1.75 ± 0.10	3.50 ± 0.05	4.00 ± 0.10	4.00 ± 0.10	2.00 ± 0.05	8.00 + 0.30 − 0.10	11.10 ± 0.20
	(inch)	0.069 ± 0.004	0.138 ± 0.002	0.157 ± 0.004	0.157 ± 0.004	0.079 ± 0.002	0.315 + 0.012 − 0.004	0.437 ± 0.008