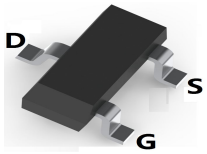
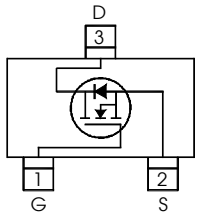
UDF®

IRLML2402

N-CHANNEL POWER MOSFET





FEATURES

- Ultra low on-resistance:V_{DS}=20V,$R_{DS(ON)}$=0.25Ω@V_{GS}=4.5V,I_D=1.2A
- Surface Mount device

MECHANICAL DATA

- Case: SOT-23
- Case Material: Molded Plastic. UL flammability
- Classification Rating: 94V-0
- Moisture Sensitivity: Level 1 per J-STD-020
- Weight: 0.008 grams (approximate)

Absolute Maximum Ratings

	Parameter	Max.	Units
I_D @ T_A = 25°C	Continuous Drain Current, V_{GS} @ 4.5V	1.2	A
I_D @ T_A = 70°C	Continuous Drain Current, V_{GS} @ 4.5V	0.95	
I_{DM}	Pulsed Drain Current ①	7.4	
P_D @T_A = 25°C	Power Dissipation	540	mW
	Linear Derating Factor	4.3	mW/°C
V_{GS}	Gate-to-Source Voltage	± 12	V
dv/dt	Peak Diode Recovery dv/dt ②	5.0	V/ns
T_J, T_{STG}	Junction and Storage Temperature Range	-55 to + 150	°C

Thermal Resistance

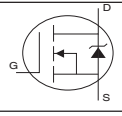
	Parameter	Typ.	Max.	Units
$R_{\theta JA}$	Maximum Junction-to-Ambient ④	—	230	°C/W

Electrical Characteristics @ T_J = 25°C (unless otherwise specified)

	Parameter	Min.	Typ.	Max.	Units	Conditions
$V_{(BR)DSS}$	Drain-to-Source Breakdown Voltage	20	—	—	V	V_{GS} = 0V, I_D = 250μA
$\Delta V_{(BR)DSS}/\Delta T_J$	Breakdown Voltage Temp. Coefficient	—	0.024	—	V/°C	Reference to 25°C, I_D = 1mA
$R_{DS(on)}$	Static Drain-to-Source On-Resistance	—	—	0.25	Ω	V_{GS} = 4.5V, I_D = 0.93A ③
		—	—	0.35		V_{GS} = 2.7V, I_D = 0.47A ③
$V_{GS(th)}$	Gate Threshold Voltage	0.70	—	—	V	V_{DS} = V_{GS}, I_D = 250μA
g_{fs}	Forward Transconductance	1.3	—	—	S	V_{DS} = 10V, I_D = 0.47A
I_{DSS}	Drain-to-Source Leakage Current	—	—	1.0	μA	V_{DS} = 16V, V_{GS} = 0V
		—	—	25		V_{DS} = 16V, V_{GS} = 0V, T_J = 125°C
I_{GSS}	Gate-to-Source Forward Leakage	—	—	-100	nA	V_{GS} = -12V
	Gate-to-Source Reverse Leakage	—	—	100		V_{GS} = 12V
Q_g	Total Gate Charge	—	2.6	3.9	nC	I_D = 0.93A
Q_{gs}	Gate-to-Source Charge	—	0.41	0.62		V_{DS} = 16V
Q_{gd}	Gate-to-Drain ("Miller") Charge	—	1.1	1.7		V_{GS} = 4.5V, See Fig. 6 and 9 ③
$t_{d(on)}$	Turn-On Delay Time	—	2.5	—	ns	V_{DD} = 10V
t_r	Rise Time	—	9.5	—		I_D = 0.93A
$t_{d(off)}$	Turn-Off Delay Time	—	9.7	—		R_G = 6.2Ω
t_f	Fall Time	—	4.8	—		R_D = 11Ω, See Fig. 10 ③
C_{iss}	Input Capacitance	—	110	—	pF	V_{GS} = 0V
C_{oss}	Output Capacitance	—	51	—		V_{DS} = 15V
C_{rss}	Reverse Transfer Capacitance	—	25	—		f = 1.0MHz, See Fig. 5

Source-Drain Ratings and Characteristics

	Parameter	Min.	Typ.	Max.	Units	Conditions
I_S	Continuous Source Current (Body Diode)	—	—	0.54	A	MOSFET symbol showing the integral reverse p-n junction diode.
I_{SM}	Pulsed Source Current (Body Diode) ①	—	—	7.4		
V_{SD}	Diode Forward Voltage	—	—	1.2	V	T_J = 25°C, I_S = 0.93A, V_{GS} = 0V ③
t_{rr}	Reverse Recovery Time	—	25	38	ns	T_J = 25°C, I_F = 0.93A
Q_{rr}	Reverse RecoveryCharge	—	16	24	nC	di/dt = 100A/μs ③



Notes: ① Repetitive rating; pulse width limited by max. junction temperature. (See fig. 11)
② I_{SD} ≤ 0.93A, di/dt ≤ 90A/μs, V_{DD} ≤ $V_{(BR)DSS}$, T_J ≤ 150°C
③ Pulse width ≤ 300μs; duty cycle ≤ 2%.
④ Surface mounted on FR-4 board, t ≤ 5sec.

Typical Characteristics

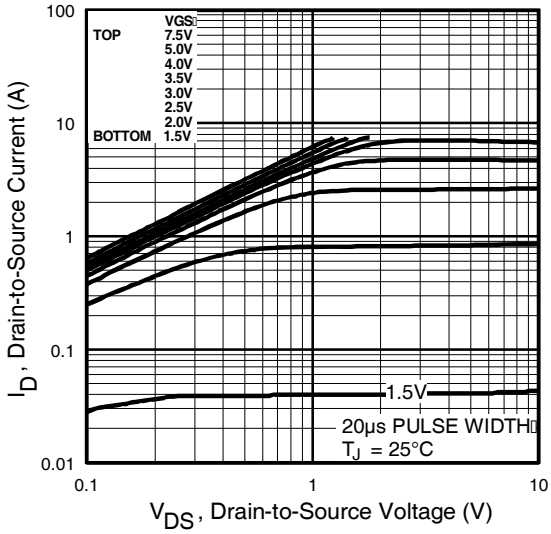


Fig 1. Typical Output Characteristics

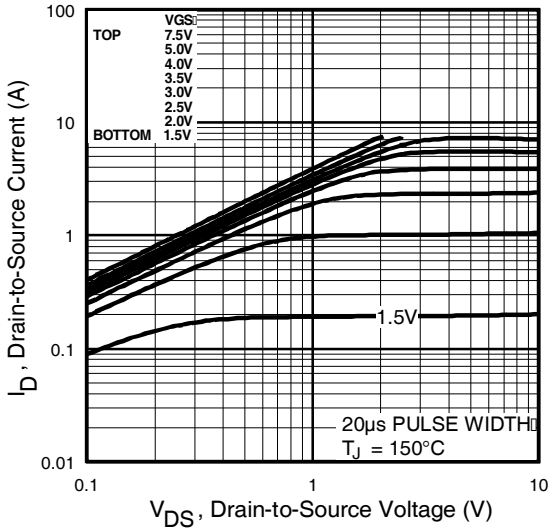


Fig 2. Typical Output Characteristics

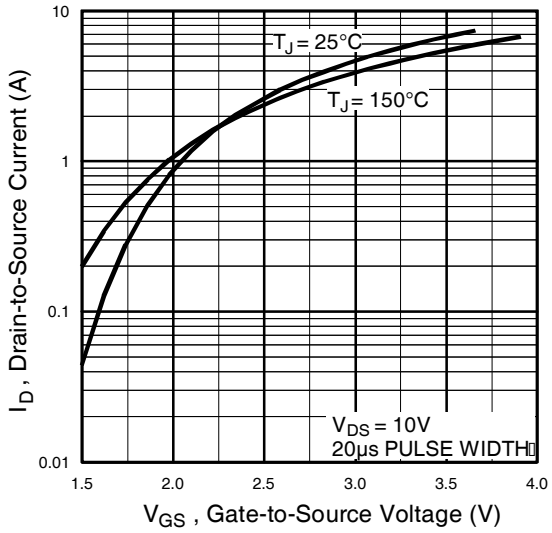


Fig 3. Typical Transfer Characteristics

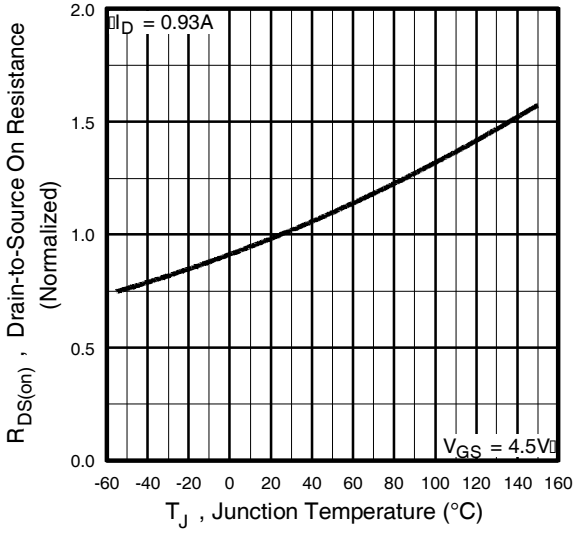


Fig 4. Normalized On-Resistance Vs. Temperature

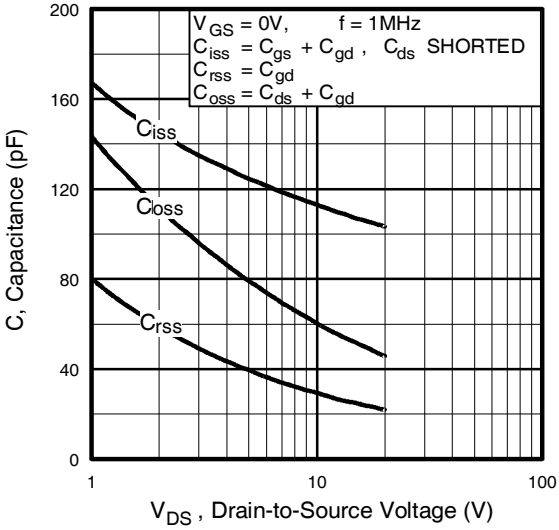


Fig 5. Typical Capacitance Vs. Drain-to-Source Voltage

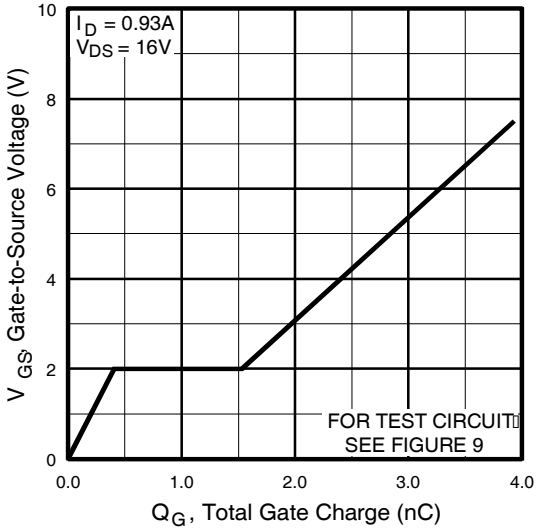


Fig 6. Typical Gate Charge Vs. Gate-to-Source Voltage

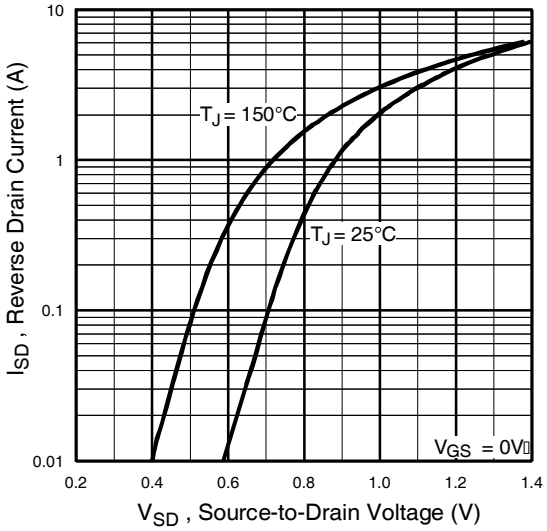


Fig 7. Typical Source-Drain Diode Forward Voltage

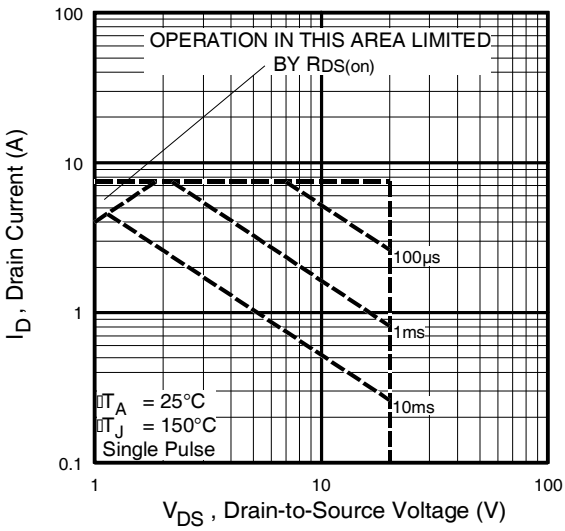


Fig 8. Maximum Safe Operating Area

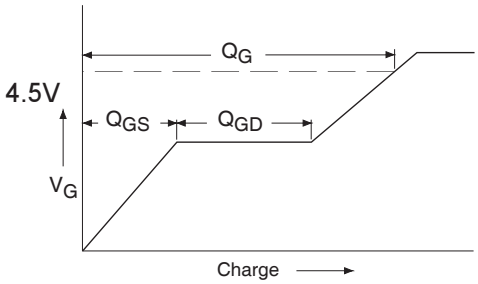


Fig 9a. Basic Gate Charge Waveform

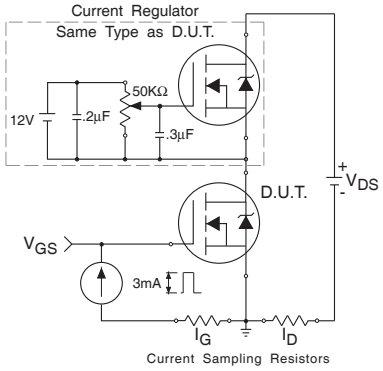


Fig 9b. Gate Charge Test Circuit

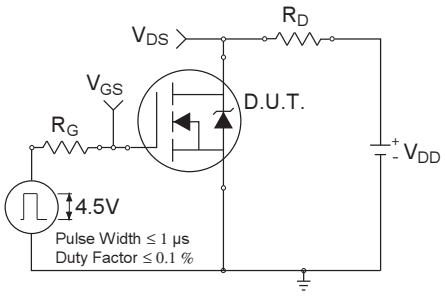


Fig 10a. Switching Time Test Circuit

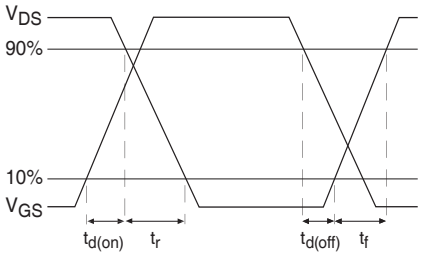


Fig 10b. Switching Time Waveforms

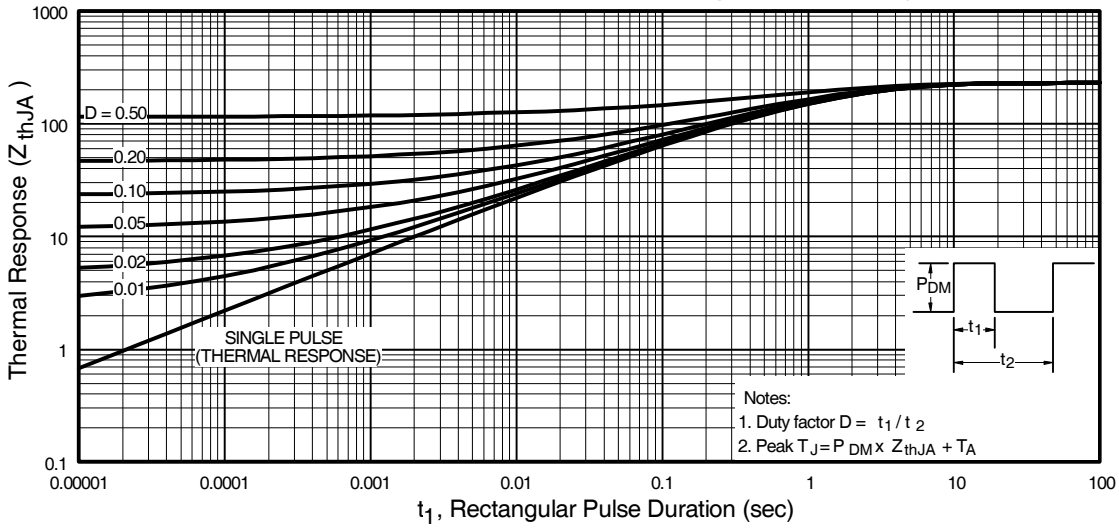
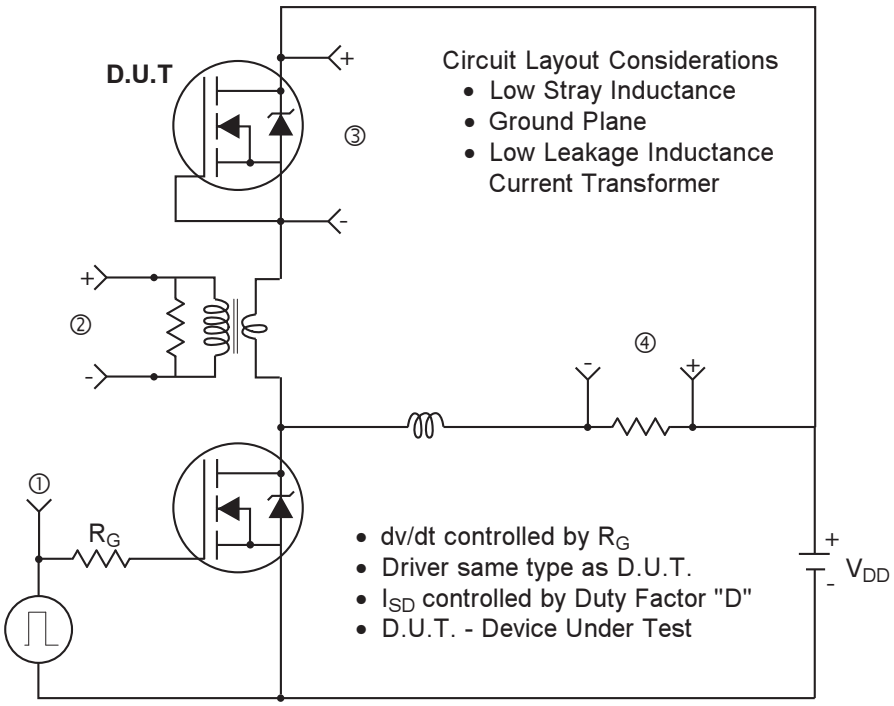


Fig 11. Maximum Effective Transient Thermal Impedance, Junction-to-Ambient

Peak Diode Recovery dv/dt Test Circuit



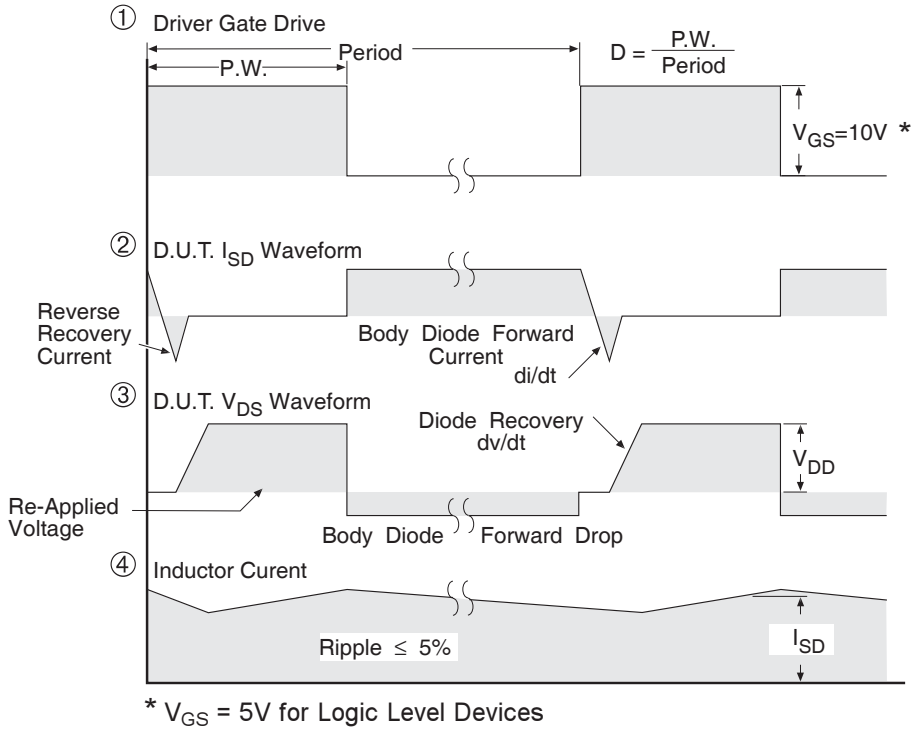
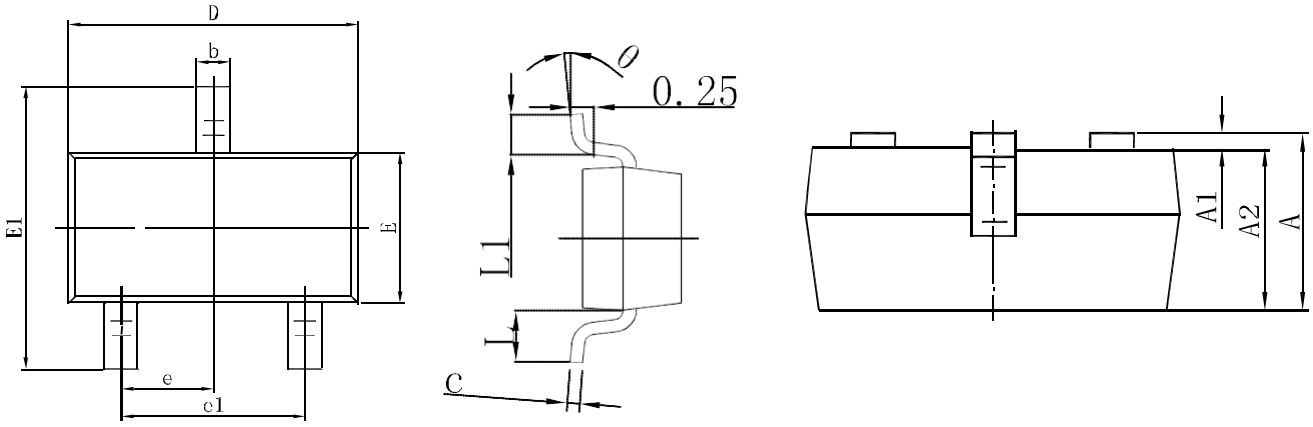


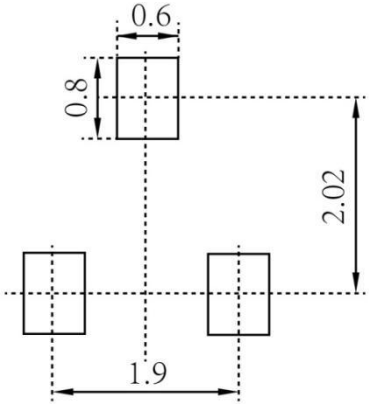
Fig 12. For N-Channel HEXFETS

SOT-23 Package Outline Dimensions



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min.	Max.	Min.	Max.
A	0.900	1.150	0.035	0.045
A1	0.000	0.100	0.000	0.004
A2	0.900	1.050	0.035	0.041
b	0.300	0.500	0.012	0.020
c	0.080	0.150	0.003	0.006
D	2.800	3.000	0.110	0.118
E	1.200	1.400	0.047	0.055
E1	2.250	2.550	0.089	0.100
e	0.950 TYP		0.037 TYP	
e1	1.800	2.000	0.071	0.079
L	0.550 REF		0.022 REF	
L1	0.300	0.500	0.012	0.020
θ	0°	8°	0°	8°

SOT-23 Suggested Pad Layout



Note:

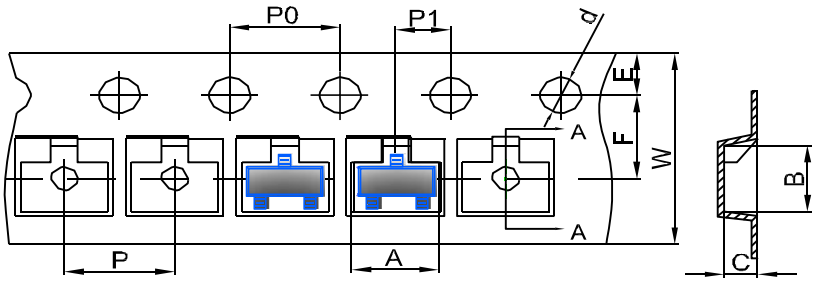
1.Controlling dimension: in millimeters

2.General tolerance: ±0.05mm

3.The pad layout is for reference purposes only

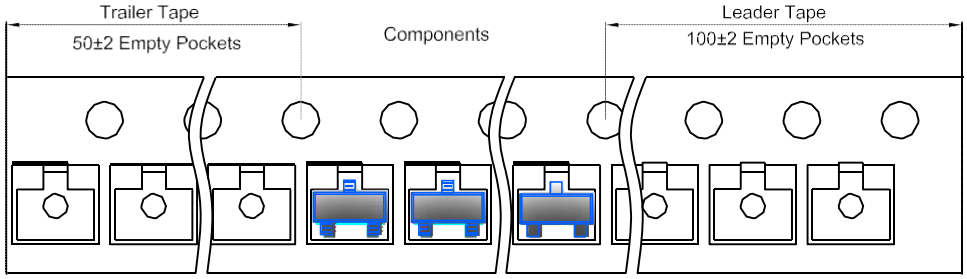
SOT-23 Tape and Reel

SOT-23 Embossed Carrier Tape

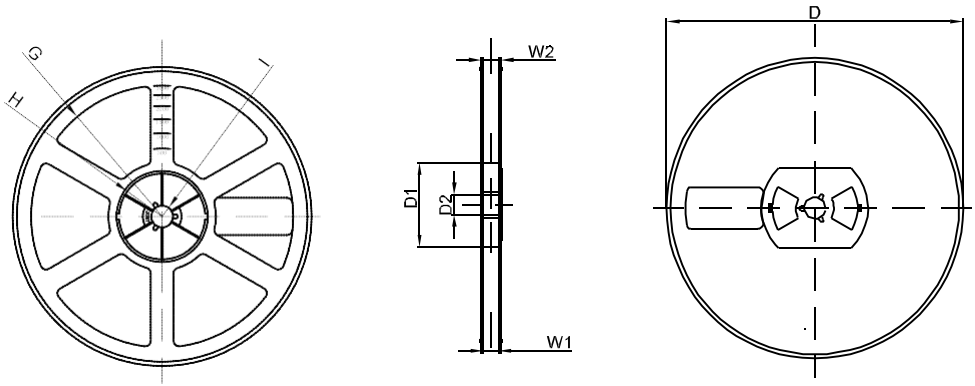


	DIMENSIONS ARE IN MILLIMETER									
TYPE	A	B	C	d	E	F	P0	P	P1	W
SOT-23	3.15	2.77	1.22	Ø1.50	1.75	3.50	4.00	4.00	2.00	8.00
TOLERANCE	±0.1	±0.1	±0.1	±0.1	±0.1	±0.1	±0.1	±0.1	±0.1	±0.1

SOT-23 Tape Leader and Trailer



SOT-23 Reel



	DIMENSIONS ARE IN MILLIMETER							
REEL OPTION	D	D1	D2	G	H	I	W1	W2
7” DIA	Ø178	54.40	13.00	R78	R25.60	R6.50	9.50	12.30
TOLERANCE	±2	±1	±1	±1	±1	±1	±1	±1