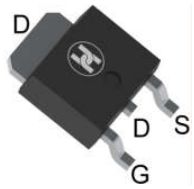
N-CHANNEL Power MOSFET



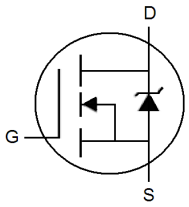
TO-252

FEATURES

- V_{DS}: 200V Min, I_D: 5A Max.
- $R_{DS(ON)}$:0.6Ω(max.)@V_{GS}=10V,I_D=2.5A
- High density cell design for ultra low on-resistance
- Fully characterized avalanche voltage and current

MECHANICAL DATA

- Case: TO-252
- Case material: Molded Plastic. UL flammability 94V-0
- Weight:0.33grams(approximate)
- Marking:D5N20



EQUIVALENT CIRCUIT

MAXIMUM RATINGS (T_A=25°C unless otherwise noted)

Parameter	Symbol	Value	Unit
Drain-source voltage	V_{DS}	200	V
Gate-source voltage	V_{GS}	±20	V
Continuous drain current, V_{GS}=10V	I_D	5	A
Pulsed drain current (Note 1)	I_{DM}	20	A
Power dissipation	P_D	78	W
Thermal resistance from junction to Case	$R_{\theta Jc}$	1.6	C/W
Operating junction and storage temperature	T_J,T_{STG}	-55~+150	°C
Single Pulsed Avalanche Energy (note 1)	E_{AS}	125	mJ
Lead Temperature for Soldering Purposes (1/8" from case for 10s)	T_L	260	°C

Note: 1. E_{AS} condition: V_{DD}=20V,L=0.5mH, R_G=25Ω, Starting T_J = 25°C

N-CHANNEL Power MOSFET

ELECTRICAL CHARACTERISTICS (TA=25°C unless otherwise noted)

Parameter	Symbol	Min	Typ	Max	Unit	Conditions
Off characteristics						
Drain-Source breakdown voltage	$V_{(BR)DS}$	200			V	V_{GS}=0V,I_D=250μA
Zero gate voltage drain current	I_{DSS}			1	uA	V_{DS}=200V, V_{GS}=0V
Gate-body leakage current	I_{GSS}			±100	nA	V_{DS}=0V, V_{GS}=±20V
On characteristics (note1)						
Gate-threshold voltage	$V_{GS(th)}$	2.0	-	4.0	V	V_{DS}=V_{GS}, I_D=250μA
Drain-source on-resistance	$R_{DS(ON)}$		0.57	0.6	Ω	V_{GS}=10V,I_D= 2.5A
Forward transconductance	g_{FS}		5		S	V_{DS}=30V,I_D=2.5A
Dynamic characteristics (Guaranteed by design, not subject to production)						
Input capacitance	Ciss		255		pF	V_{GS}=0V V_{DS}=25V f=1.0MHz
Output capacitance	Coss		30.2		pF	
Reverse transfer capacitance	Crss		2.3		pF	
Switching characteristics (Guaranteed by design, not subject to production)						
Turn-on delay time	$t_{d(on)}$		7.3		ns	V_{DD}=100V I_D=5 A R_G=10Ω V_{GS}=10V
Turn-on rise time	t_r		10.7		ns	
Turn-off delay time	$t_{d(off)}$		18.2		ns	
Turn-off fall time	t_f		11.9		ns	
Total gate charge	Qg		10.8		nC	V_{DS}=160V, V_{GS}=10V I_D=5A
Gate-source charge	Qgs		1.7		nC	
Gate-drain charge	Qgd		3.1		nC	
Drain-source diode characteristics						
Diode forward voltage	VSD			2	V	I_S=5A, V_{GS}=0V
Max. forward current	Is			5	A	
Pulsed drain-source diode forward current	ISM			20	A	

Notes: 1. Pulse Test: Pulse Width≤300μs, duty cycle ≤2%.

N-CHANNEL Power MOSFET

TYPICAL CHARACTERISTICS

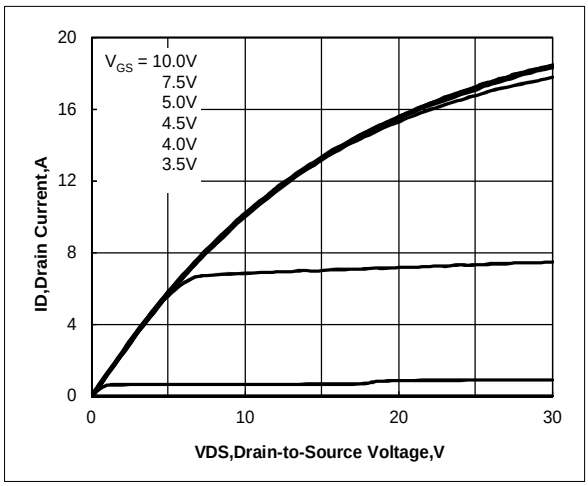


Figure 1. Output Characteristics

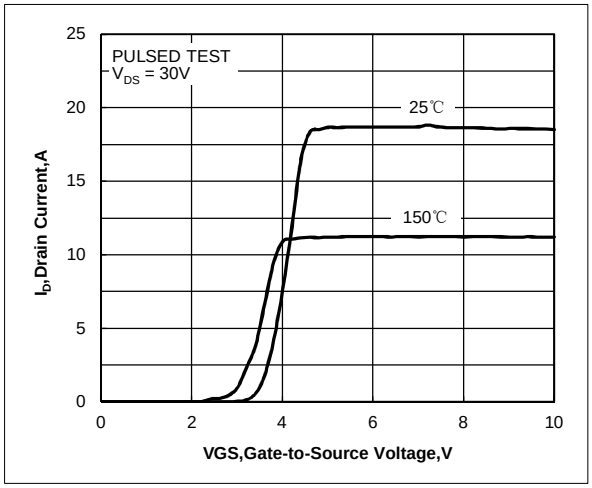


Figure 2. Transfer Characteristics

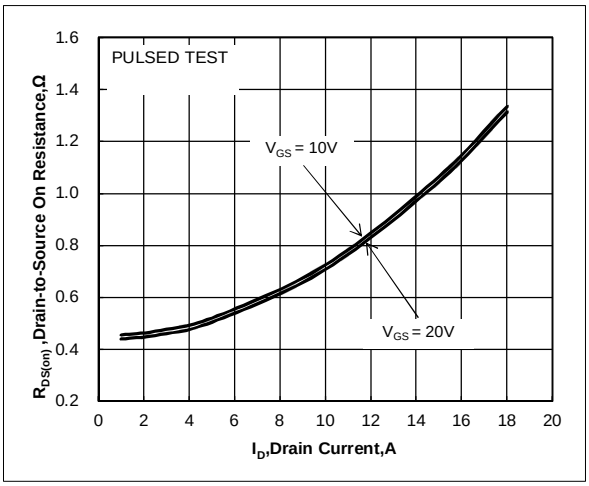


Figure 3. Drain-to-Source On Resistance vs. Drain Current and Gate Voltage

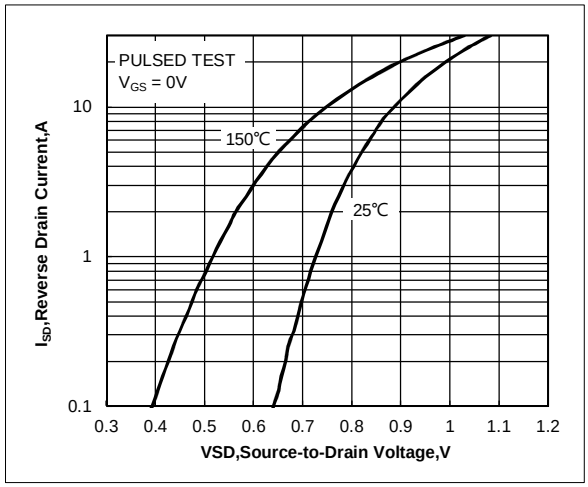
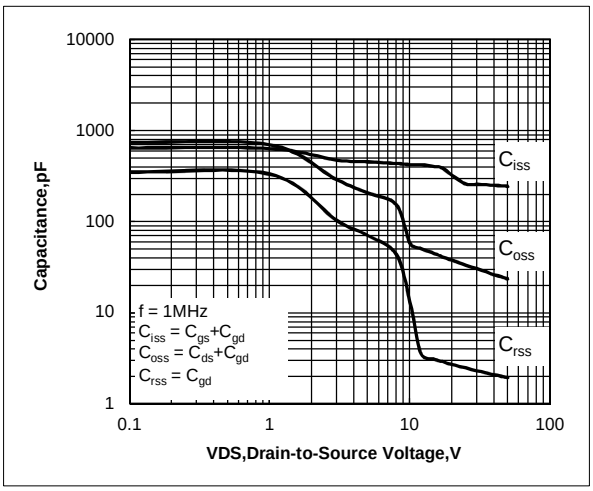
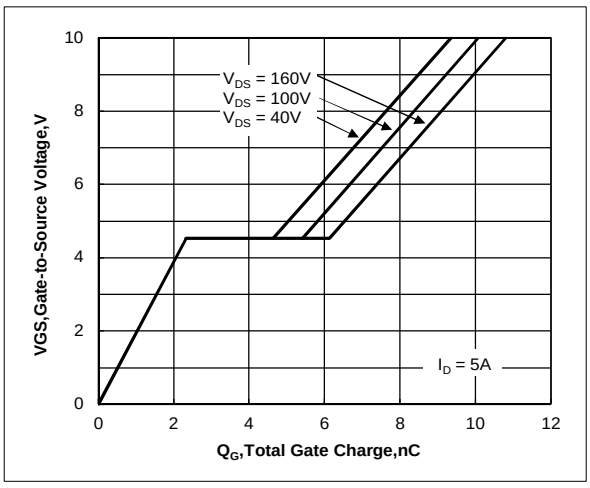


Figure 4. Body Diode Forward Voltage vs. Source Current and Temperature





N-CHANNEL Power MOSFET

TYPICAL CHARACTERISTICS

Figure 5. Capacitance Characteristics

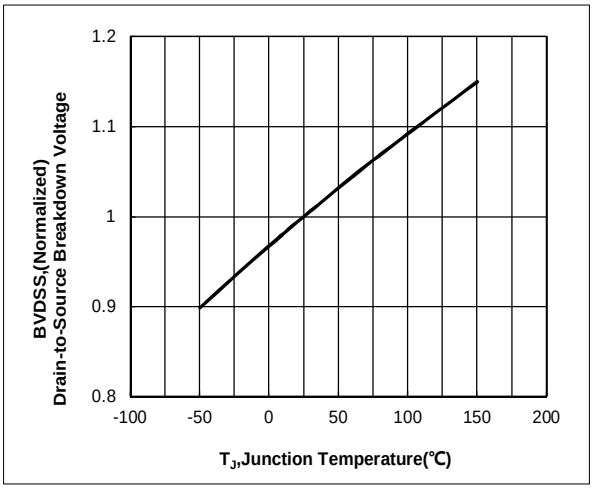


Figure 6. Gate Charge Characteristics

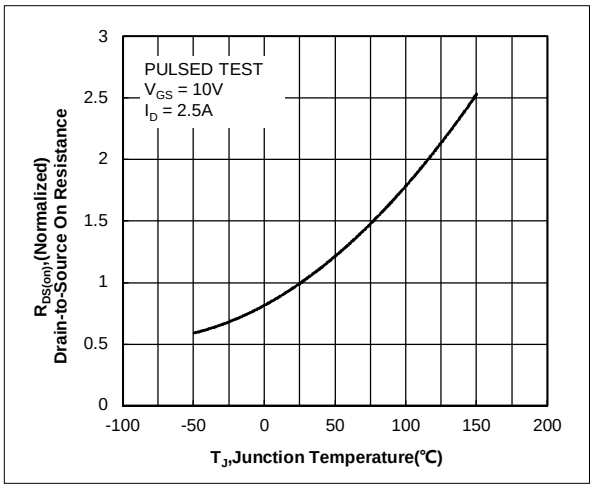
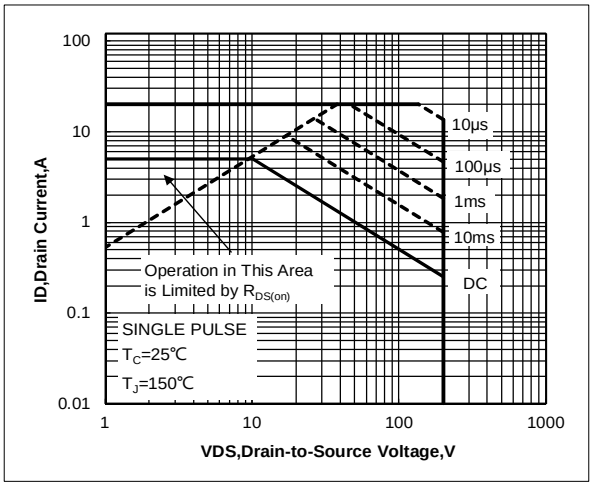


Figure 7. Normalized Breakdown Voltage vs. Junction Temperature

Figure 8. Normalized On Resistance vs. Junction Temperature



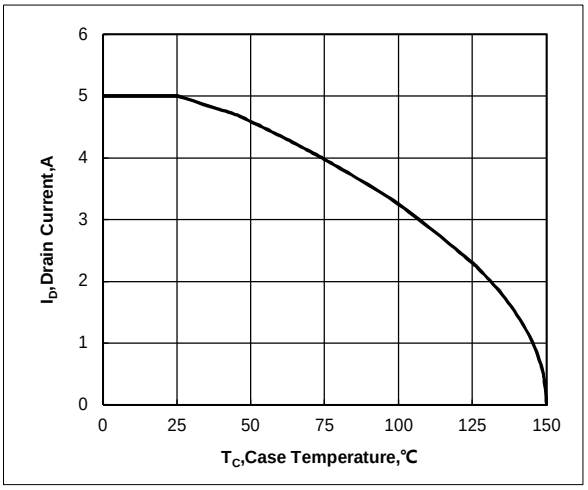
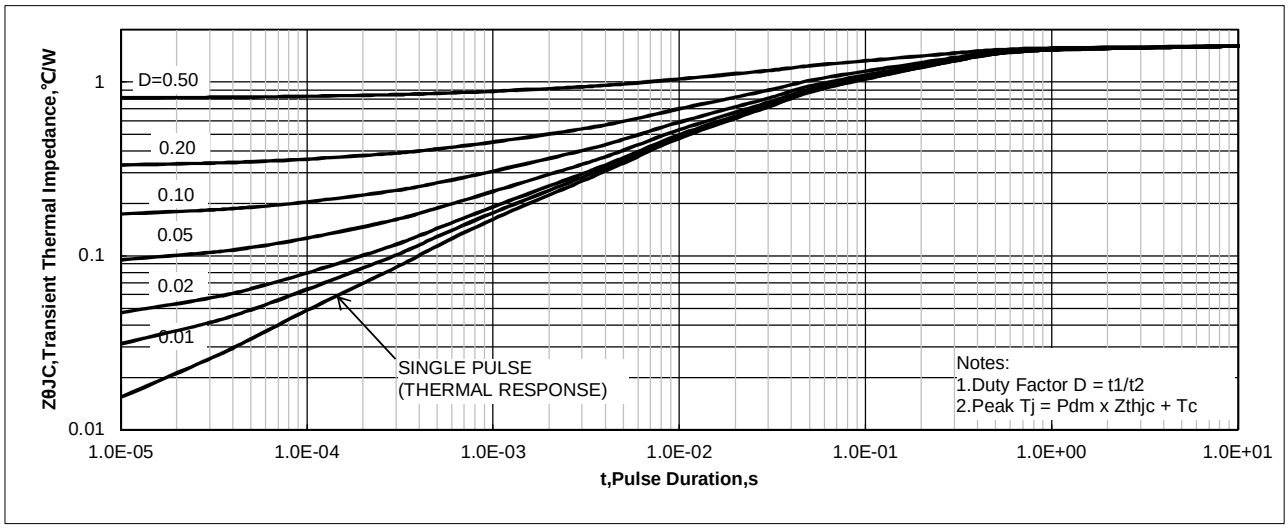


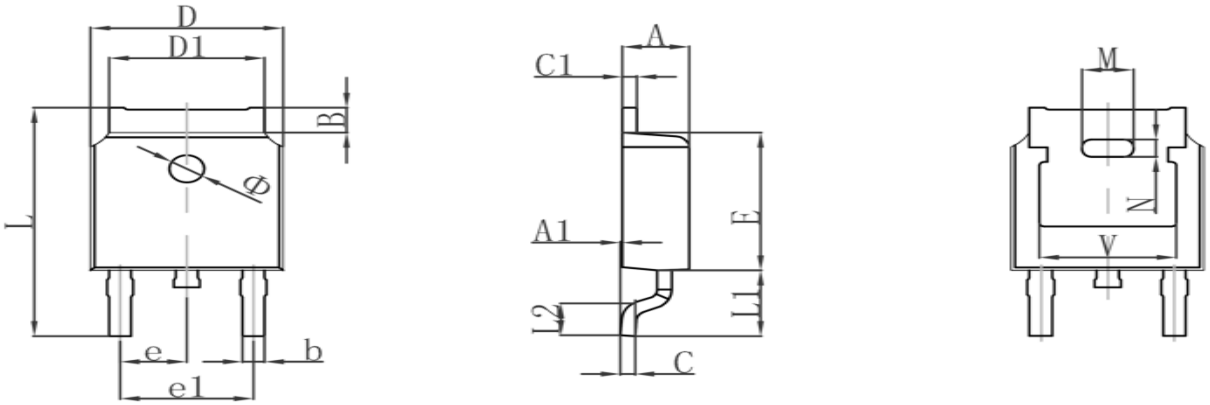
Figure 9. Maximum Safe Operating Area for RU5N20A

Figure 10. Maximum Continuous Drain Current vs. Case Temperature



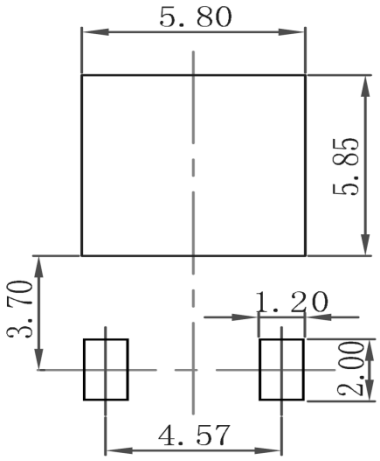
N-CHANNEL Power MOSFET

TO-252 PACKAGE OUTLINE DIMENSIONS



Symbol	DimensionsIn Millimeters		DimensionsIn Inches	
	Min.	Max.	Min.	Max.
A	2.200	2.380	0.087	0.094
A1	0.000	0.100	0.000	0.004
B	0.800	1.400	0.031	0.055
b	0.710	0.810	0.028	0.032
c	0.460	0.560	0.018	0.022
c1	0.460	0.560	0.018	0.022
D	6.500	6.700	0.256	0.264
D1	5.130	5.460	0.202	0.215
E	6.000	6.200	0.236	0.244
e	2.286TYP		0.090TYP	
e1	4.327	4.727	0.170	0.186
M	1.778REF		0.070REF	
N	0.762REF		0.018REF	
L	9.800	10.400	0.386	0.409
L1	2.9REF		0.114REF	
L2	1.400	1.700	0.055	0.067
V	4.830REF		0.190REF	
Φ	1.100	1.300	0.043	0.051

TO-252 SUGGESTED PAD LAYOUT

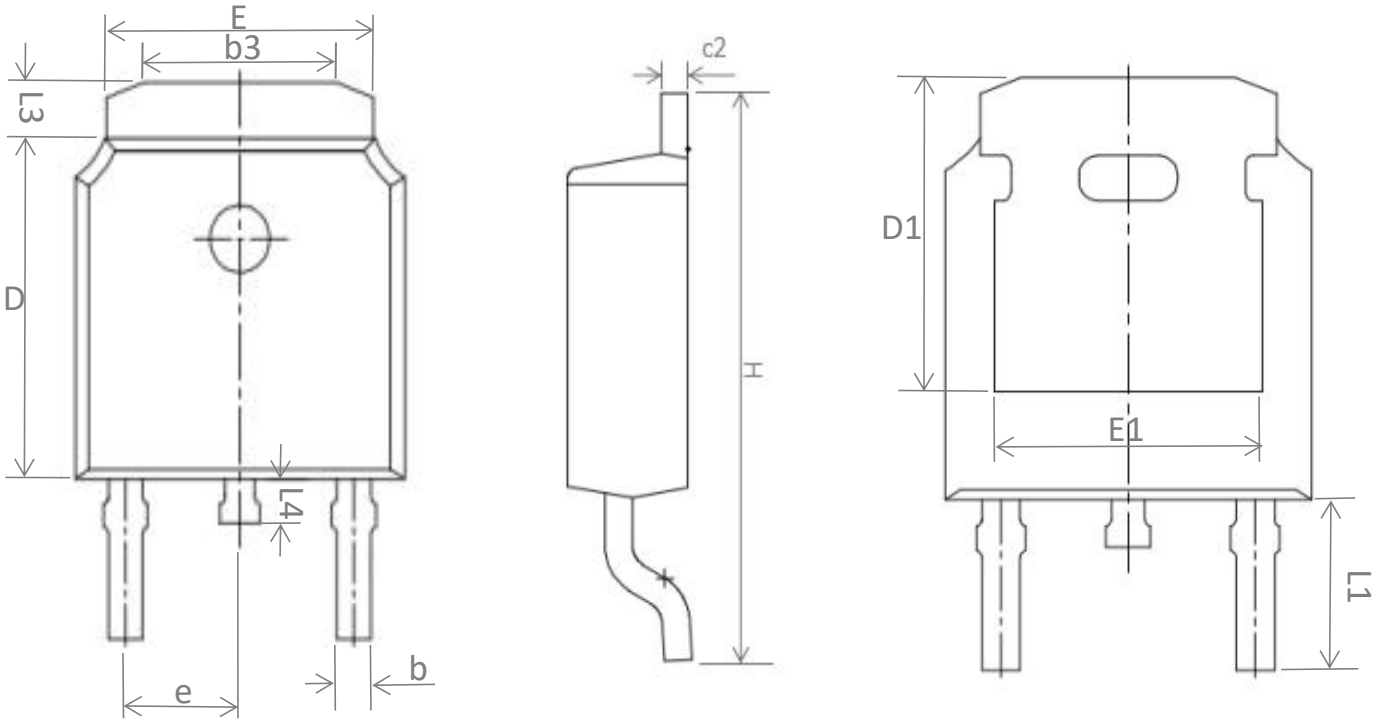


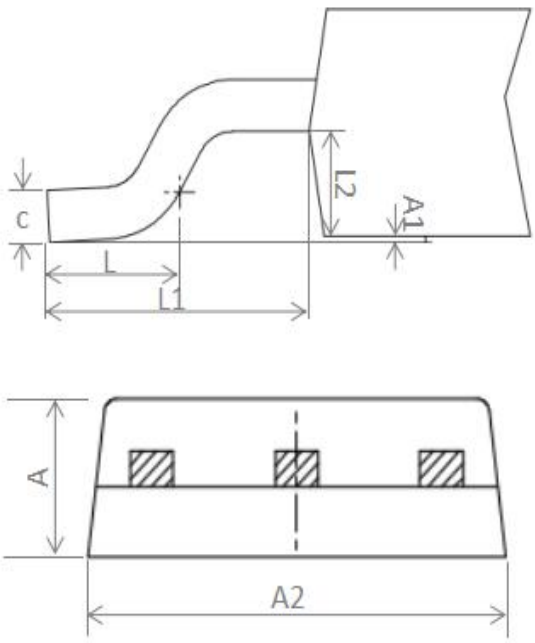
Note:

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

N-CHANNEL Power MOSFET

TO252 Package Outline Dimensions



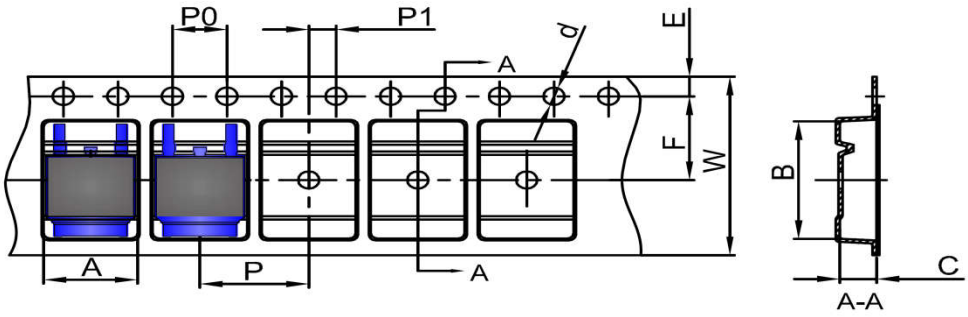


SYMBOL	Spec (mm)
A	2.3±0.1
A1	0-0.15
A2	6.6±0.1
b	0.67±0.1
b3	3.85±0.2
c	0.508±0.1
c2	0.508±0.1
D	6.1±0.15
D1	5.249±0.15
E	5.334±0.15
E1	4.826±0.15
e	2.286REF
H	10.0±0.2
L	1.5±0.15
L1	2.888±0.2
L2	0.9-1.1
L3	1.0REF
L4	0.9±0.2

N-CHANNEL Power MOSFET

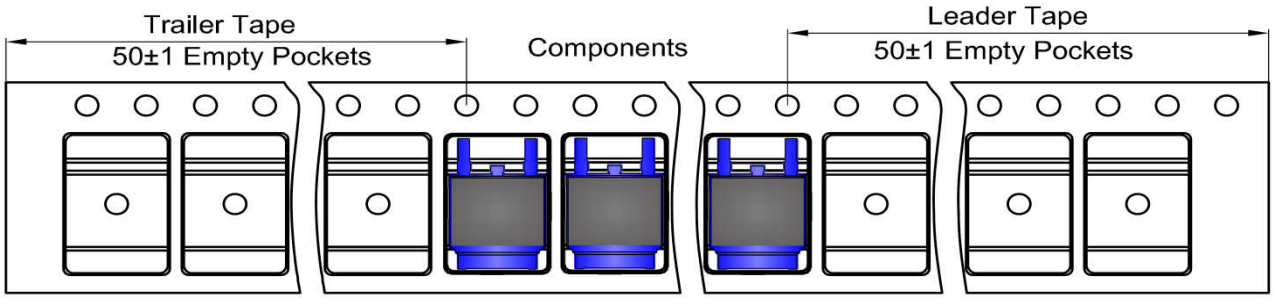
TO-252 TAPE AND REEL

TO-252 Embossed Carrier Tape

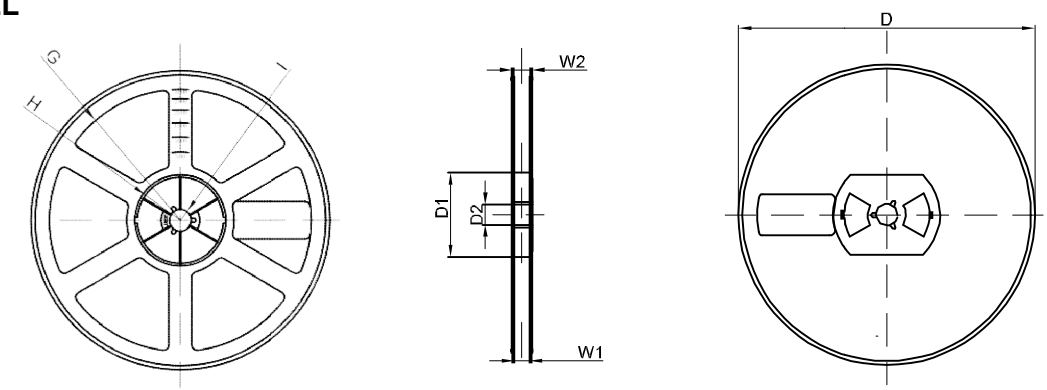


	DIMENSIONS ARE IN MILLIMETER									
TYPE	A	B	C	d	E	F	P0	P	P1	W
TO-252	6.90	10.50	2.70	Ø1.55	1.75	7.50	4.00	8.00	2.00	16.00
TOLERANCE	±0.1	±0.1	±0.1	±0.1	±0.1	±0.1	±0.1	±0.1	±0.1	±0.1

TO-252 Tape Leader and Trailer



TO-252 REEL



	DIMENSIONS ARE IN MILLIMETER							
REEL OPTION	D	D1	D2	G	H	I	W1	W2
13” DIA	Ø330.00	100.00	Φ21.00	R151.00	R56.00	R6.50	16.40	21.00
TOLERANCE	±2	±1	±1	±1	±1	±1	±1	±1