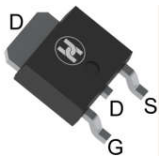
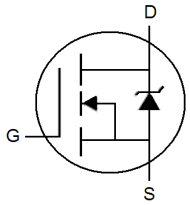
N-CHANNEL Power MOSFET

FEATURES

- V_{DS}: 40V, I_D: 120A Max.
- $R_{DS(ON)}$:2.6mΩ(max.)@V_{GS}=10V,I_D=50A
- $R_{DS(ON)}$:3.5mΩ(max.)@V_{GS}=4.5V, I_D=50A
- High density cell design for ultra low on-resistance
- Fully characterized avalanche voltage and current



TO-252



EQUIVALENT CIRCUIT

MECHANICAL DATA

- Case: TO-252
- Case material: Molded Plastic. UL flammability 94V-0
- Weight:0.33grams(approximate)
- Marking:D120N04

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

Parameter	Symbol	Value	Unit
Drain-source voltage	V_{DS}	40	V
Gate-source voltage	V_{GS}	±20	V
Continuous drain current	I_D	120	A
Pulsed drain current (Note 1)	I_{DM}	360	A
Power dissipation	P_D	110	W
Thermal resistance from junction to ambient	$R_{\theta JA}$	20	°C/W
Operating junction and storage temperature	T_J,T_{STG}	-55~+150	°C
Single Pulsed Avalanche Energy (note 1)	E_{AS}	70	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	$V_{(BR)DS}$	40			V	V_{GS}=0V,I_D=250μA
Zero gate voltage drain current	I_{DSS}			1	uA	V_{DS}=40V, V_{GS}=0V
Gate-body leakage current	I_{GSS}			±100	nA	V_{DS}=0V, V_{GS}=±20V
On characteristics (note1)						
Gate-threshold voltage	$V_{GS(th)}$	1.1	1.5	2.2	V	V_{DS}=V_{GS}, I_D=250μA
Drain-source on-resistance	$R_{DS(ON)}$		1.7	2.6	mΩ	V_{GS}=10V, I_D=50A
			2.5	3.5		V_{GS}=4.5V,I_D=50A
Forward transconductance	g_{FS}		10		S	V_{DS}=5V,I_D=50A
Dynamic characteristics (Guaranteed by design, not subject to production)						
Input capacitance	C_{iss}		4620		pF	V_{GS}=0V V_{DS}=20V f=1.0MHz
Output capacitance	C_{oss}		430		pF	
Reverse transfer capacitance	C_{rss}		360		pF	
Switching characteristics (Guaranteed by design, not subject to production)						
Turn-on delay time	$t_{d(on)}$		15		ns	V_{DD}=20V I_D=20A R_G=3 Ω V_{GS}=10V
Turn-on rise time	t_r		55		ns	
Turn-off delay time	$t_{d(off)}$		120		ns	
Turn-off fall time	t_f		80		ns	
Total gate charge	Q_g		100		nC	V_{DS}=10V,V_{GS}=10V, I_D=20A
Gate-source charge	Q_{gs}		16		nC	
Gate-drain charge	Q_{gd}		22		nC	
Drain-source diode characteristics						
Diode forward voltage	V_{SD}			1.2	V	I_S=15A,V_{GS}=0V
Max. forward current	I_S			20	A	
Pulsed drain-source diode forward current	I_{SM}			120	A	

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

N-CHANNEL Power MOSFET

TYPICAL CHARACTERISTICS

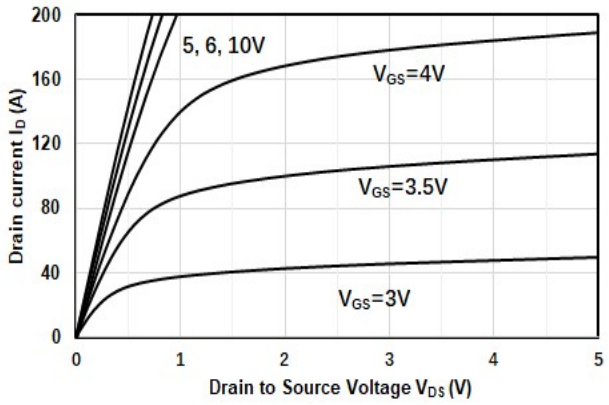


Figure1. Output Characteristics

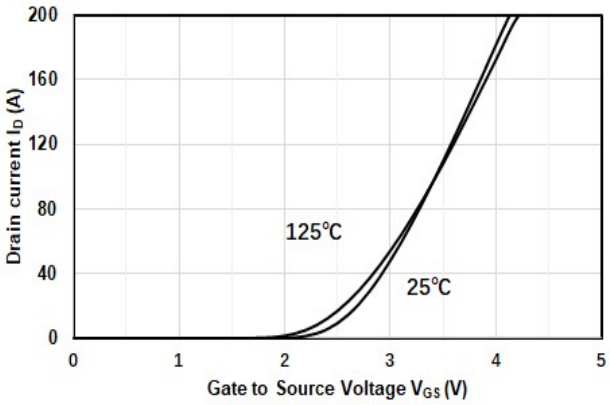


Figure2. Transfer Characteristics

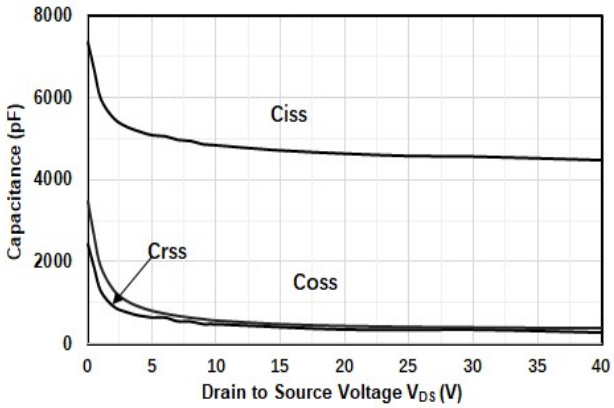


Figure3. Capacitance Characteristics

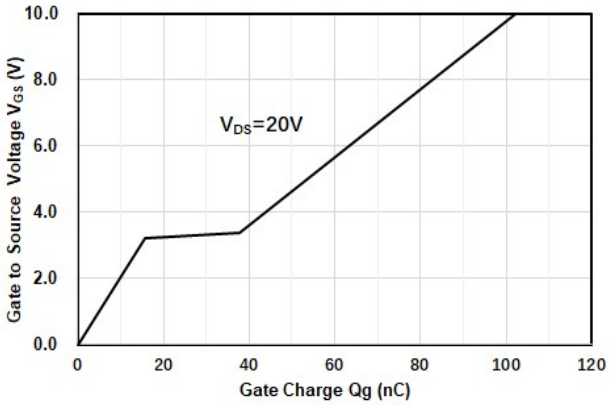


Figure4. Gate Charge

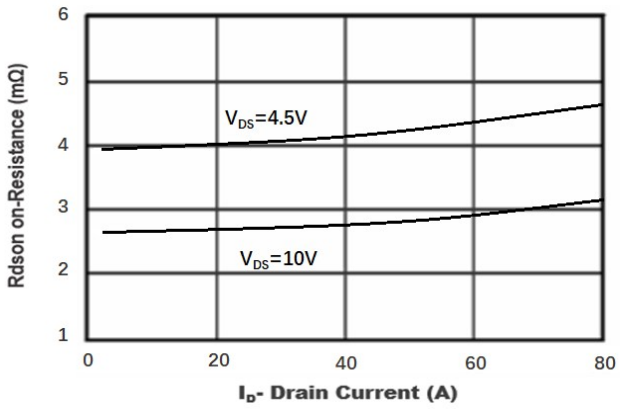


Figure5. Drain-Source on Resistance

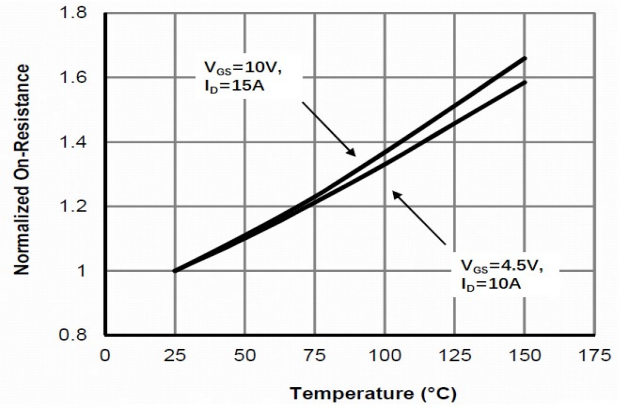
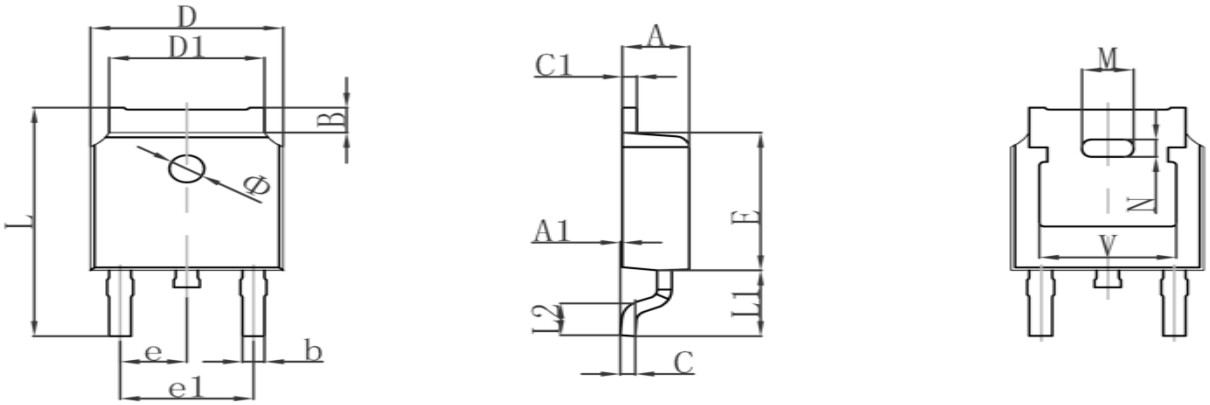


Figure6. Drain-Source on Resistance

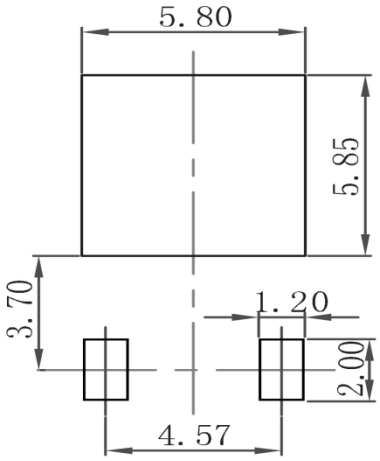
N-CHANNEL Power MOSFET

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

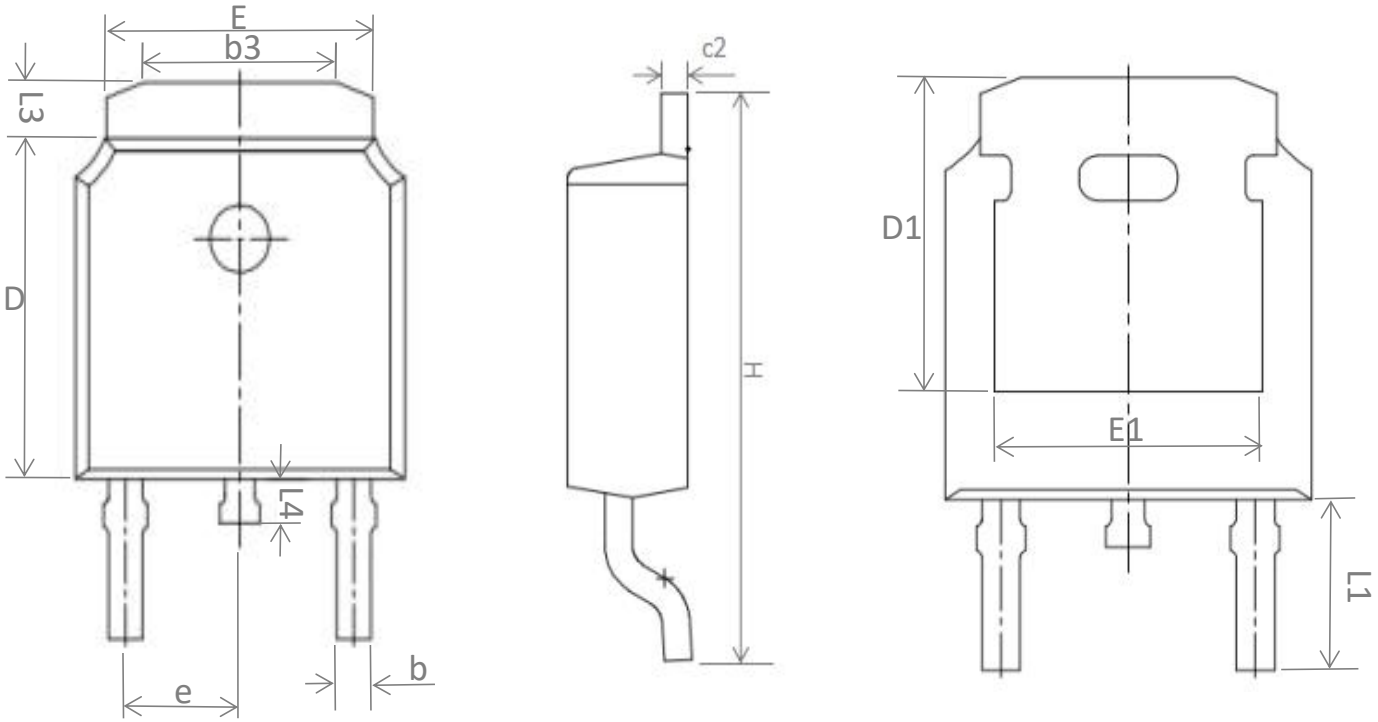


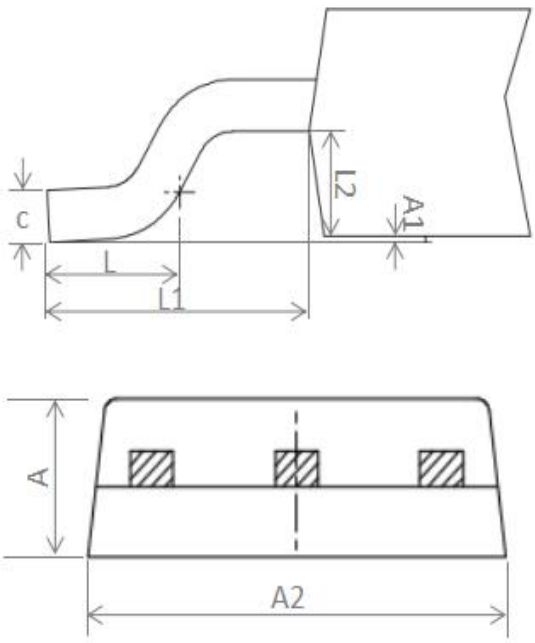
Note:

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



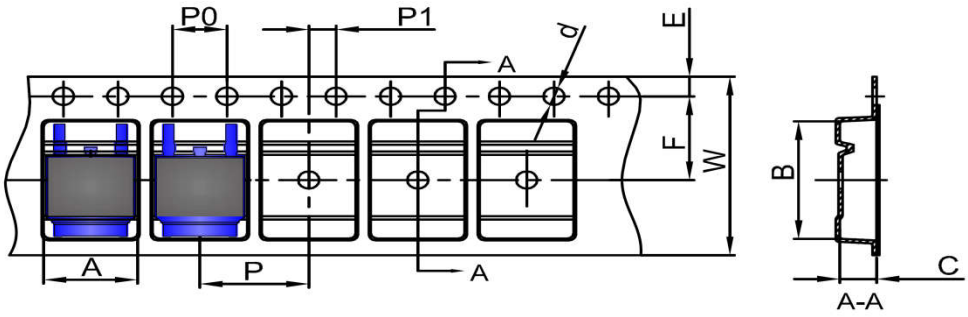


SYMBOL	Spec (mm)
A	2.3±0.1
A1	0-0.15
A2	6.6±0.1
b	0.67±0.1
b3	3.85±0.2
c	0.508±0.1
c2	0.508±0.1
D	6.1±0.15
D1	5.249±0.15
E	5.334±0.15
E1	4.826±0.15
e	2.286REF
H	10.0±0.2
L	1.5±0.15
L1	2.888±0.2
L2	0.9-1.1
L3	1.0REF
L4	0.9±0.2

N-CHANNEL Power MOSFET

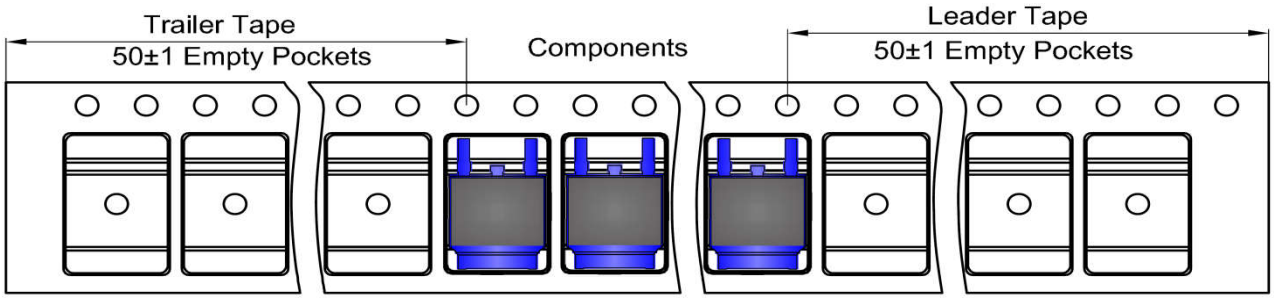
TO-252 TAPE AND REEL

TO-252 Embossed Carrier Tape

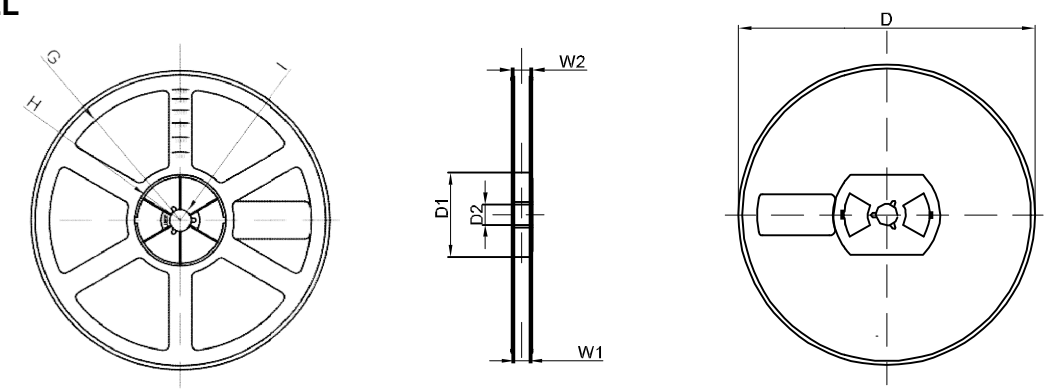


	DIMENSIONS ARE IN MILLIMETER									
TYPE	A	B	C	d	E	F	P0	P	P1	W
TO-252	6.90	10.50	2.70	Ø1.55	1.75	7.50	4.00	8.00	2.00	16.00
TOLERANCE	±0.1	±0.1	±0.1	±0.1	±0.1	±0.1	±0.1	±0.1	±0.1	±0.1

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