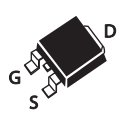
N-Channel Logic Level Enhancement Mode Field Effect Transistor

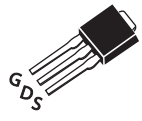
PRODUCT SUMMARY		
V_{DSS}	I_D	$R_{DS(ON)}$ (m Ω) Max
40V	50A	9 @ V_{GS} = 10V

FEATURES

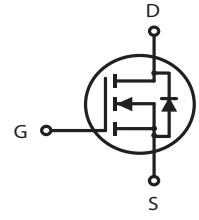
- Super high dense cell design for low $R_{DS(ON)}$.
- Rugged and reliable.
- TO-252 and TO-251 Package.



STU SERIES
TO-252AA(D-PAK)



STD SERIES
TO-251(I-PAK)



ABSOLUTE MAXIMUM RATINGS (TC=25°C unless otherwise noted)

Parameter		Symbol	Limit	Unit
Drain-Source Voltage		V_{DS}	40	V
Gate-Source Voltage		V_{GS}	±20	V
Drain Current-Continuous [a] @Ta	25°C	I_D	50	A
-Pulsed [b]		I_{DM}	100	A
Drain-Source Diode Forward Current [a]		I_S	20	A
Avalanche Current [c]		I_{AS}	23	A
Avalanche Energy [c]		E_{AS}	130	mJ
Maximum Power Dissipation [a]	Ta= 25°C	P_D	50	W
Operating Junction and Storage Temperature Range		T_J, T_{STG}	-55 to 175	°C

THERMAL CHARACTERISTICS

Thermal Resistance, Junction-to-Case	$R_{\theta JC}$	3	°C/W
Thermal Resistance, Junction-to-Ambient	$R_{\theta JA}$	50	°C/W

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ELECTRICAL CHARACTERISTICS (T_C=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 =250uA	40			V
Zero Gate Voltage Drain Current	I_{DSS}	V_{DS} =32V, V_{GS} =0V			1	uA
Gate-Body Leakage	I_{GSS}	V_{GS} = ±20V, V_{DS} =0V			±100	nA
ON CHARACTERISTICS [a]						
Gate Threshold Voltage	$V_{GS(th)}$	V_{DS} =V_{GS}, I_D = 250uA	1.25	1.6	3	V
Drain-Source On-State Resistance	$R_{DS(ON)}$	V_{GS} = 10V , I_D =10A		7	9	m ohm
		V_{GS} = 4.5V, I_D =5A		9	11	m ohm
On-State Drain Current	$I_{D(ON)}$	V_{DS} = 10V, V_{GS} = 10V	30			A
Forward Transconductance	g_{FS}	V_{DS} = 10V, I_D = 10A		28		S
DYNAMIC CHARACTERISTICS [b]						
Input Capacitance	C_{ISS}	V_{DS} =15V, V_{GS} = 0V f =1.0MHz		1130		pF
Output Capacitance	C_{OSS}			240		pF
Reverse Transfer Capacitance	C_{RSS}			145		pF
SWITCHING CHARACTERISTICS [b]						
Turn-On Delay Time	$t_{D(ON)}$	V_{DD} = 15V I_D = 10 A V_{GS} = 10V R_{GEN} = 3.3 ohm		18		ns
Rise Time	t_r			22		ns
Turn-Off Delay Time	$t_{D(OFF)}$			61		ns
Fall Time	t_f			9.6		ns
Total Gate Charge	Q_g	V_{DS} =15V, I_D =10A,V_{GS} =10V		23.5		nC
		V_{DS} =15V, I_D =10A,V_{GS} =4.5V		11.5		nC
Gate-Source Charge	Q_{gs}	V_{DS} =15V, I_D = 10A V_{GS} =10V		2.7		nC
Gate-Drain Charge	Q_{gd}			3.2		nC

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

Parameter	Symbol	Condition	Min	Typ	Max	Unit
DRAIN-SOURCE DIODE CHARACTERISTICS [a]						
Diode Forward Voltage	V_{SD}	V_{GS} = 0V, Is = 20A		0.91	1.3	V

Notes

a.Pulse Test:Pulse Width ≤ 300us, Duty Cycle ≤ 2%.

b.Guaranteed by design, not subject to production testing.

c. Starting T_J=25°C, L=0.5 mH, R_G=25Ω, I_{AS}= 23A, V_{DD} ≤ $V_{(BR)DSS}$ (See Figure13)

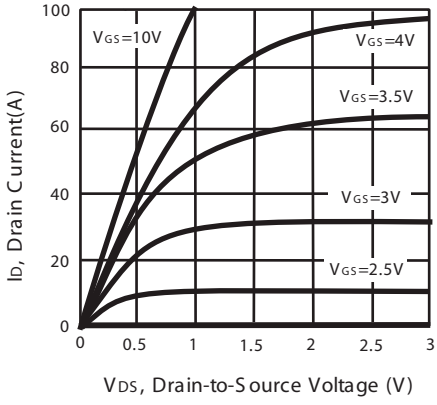

Figure 1. Output Characteristics

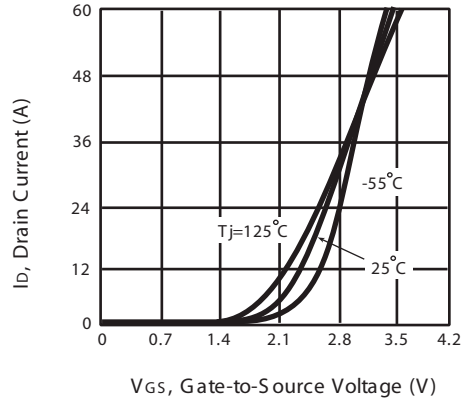

Figure 2. Transfer Characteristics

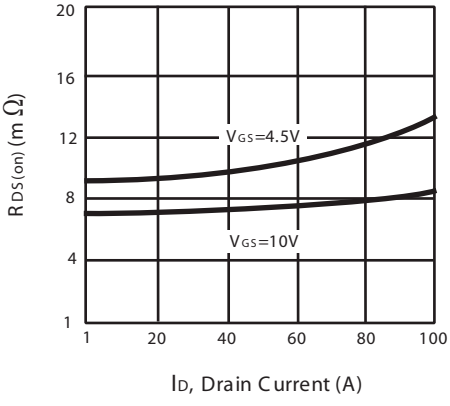

Figure 3. On-Resistance vs. Drain Current and Gate Voltage

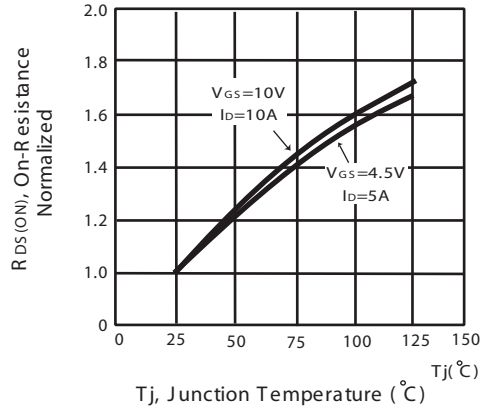

Figure 4. On-Resistance Variation with Drain Current and Temperature

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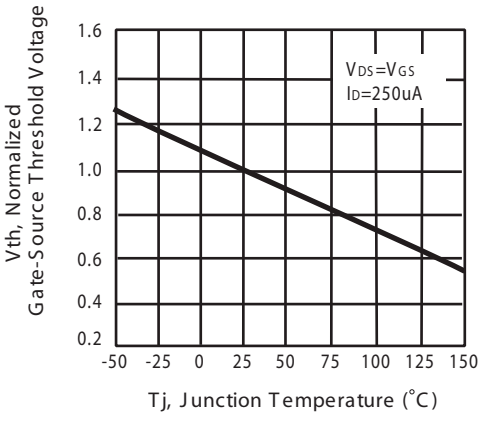

Figure 5. Gate Threshold Variation with Temperature

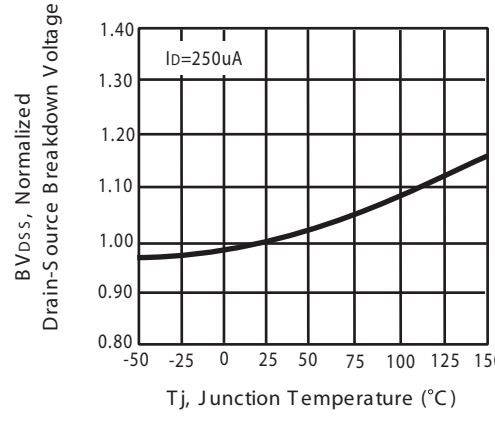

Figure 6. Breakdown Voltage Variation with Temperature

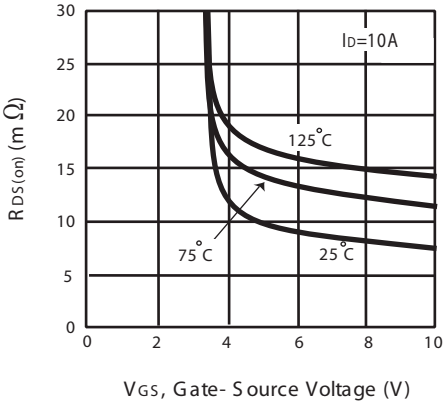

Figure 7. On-Resistance vs. Gate-Source Voltage

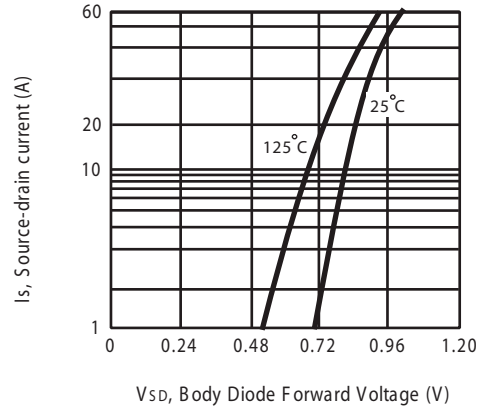

Figure 8. Body Diode Forward Voltage Variation with Source Current

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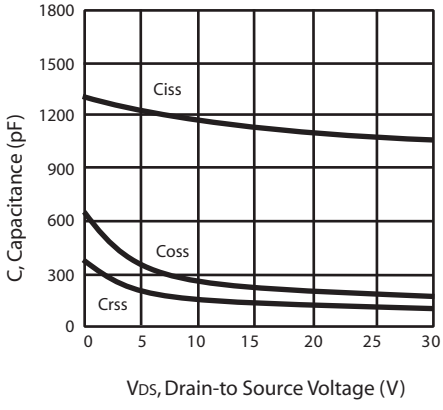


Figure 9. Capacitance

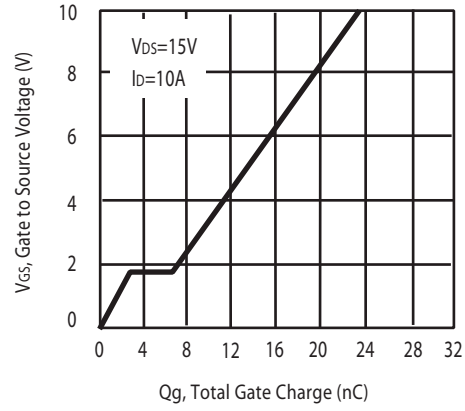


Figure 10. Gate Charge

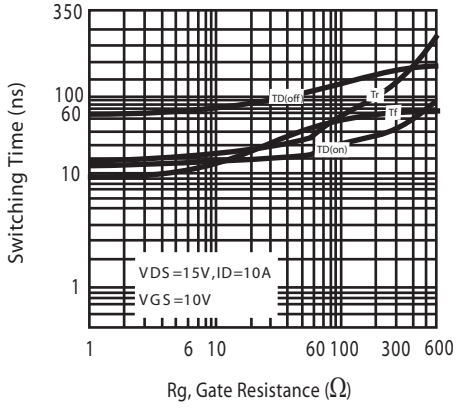


Figure 11.switching characteristics

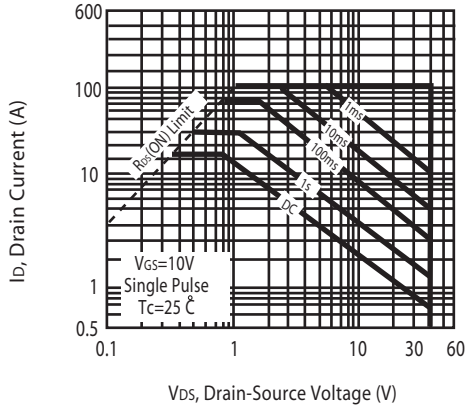
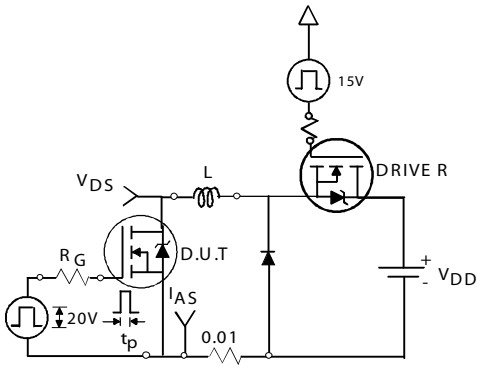
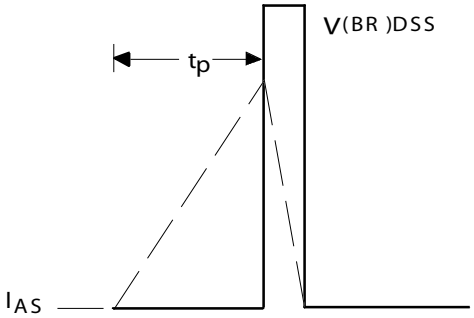


Figure 12. Maximum Safe Operating Area



Unclamped Inductive Test Circuit

Figure 13a.



Unclamped Inductive Waveforms

Figure 13b.

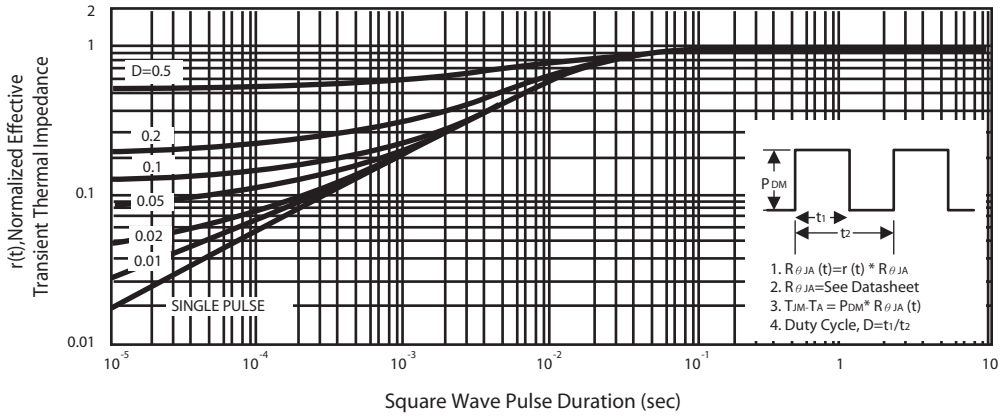


Figure 14. Normalized Thermal Transient Impedance Curve

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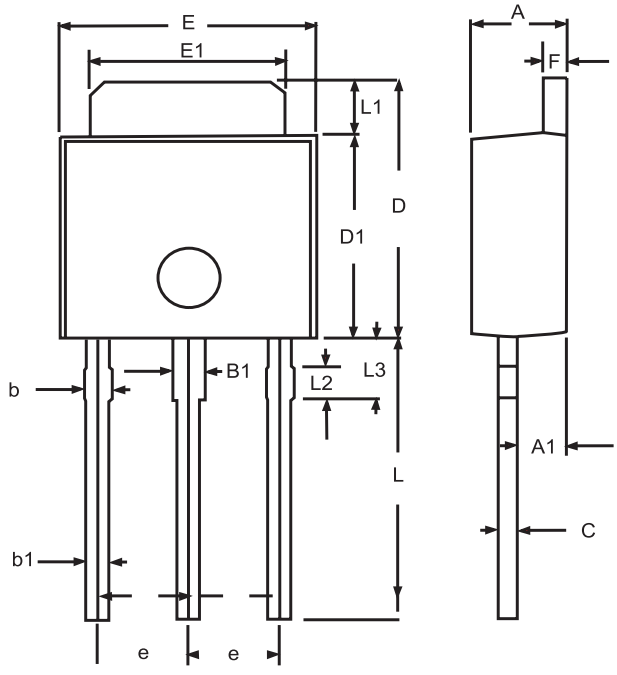
PACKAGE OUTLINE DIMENSIONS

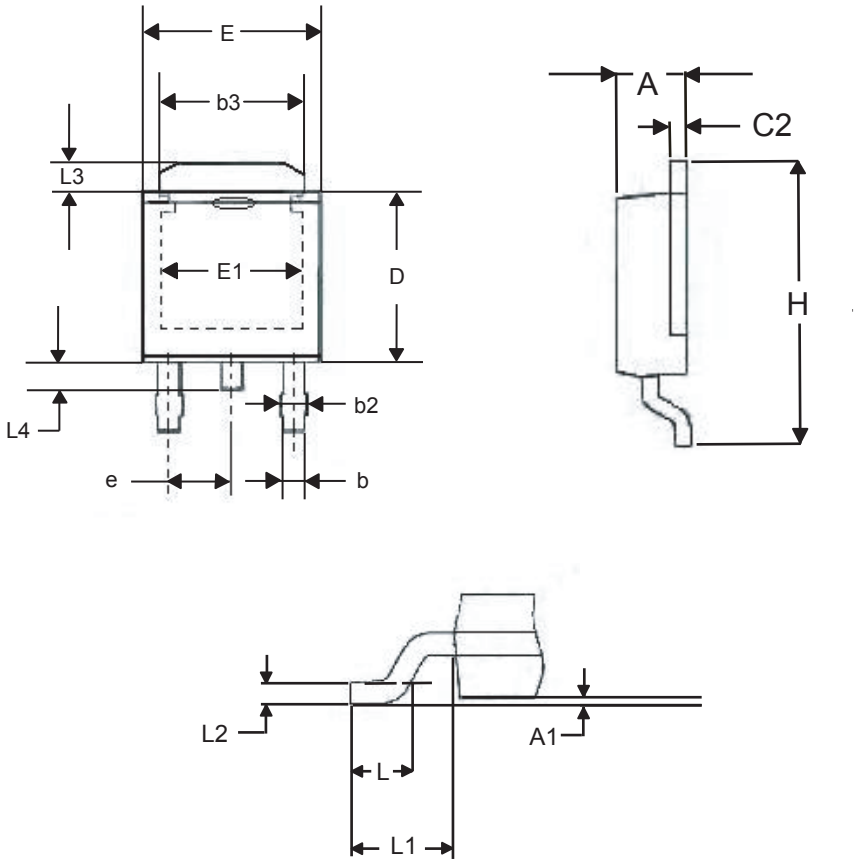
TO-251



SYMBOLS	MILLIMETERS		INCHES	
	MIN	MAX	MIN	MAX
A	2.20	2.40	0.087	0.095
A1	1.100	1.300	0.043	0.051
B1	0.650	1.050	0.026	0.041
b	0.500	0.900	0.020	0.035
b1	0.400	0.800	0.016	0..32
C	0.400	0.600	0.016	0.024
D	6.700	7.300	0.264	0.287
D1	5.400	5.650	0.213	0.222
E	6.40	6.650	0.252	0.262
e	2.100	2.500	0.083	0.098
F	0.400	0.600	0.016	0.024
L	7.000	8.000	0.276	0.315
L1	1.300	1.700	0.051	0.067
L2	0.700	0.900	0.028	0.035
L3	1.400	1.800	0.055	0.071

PACKAGE OUTLINE DIMENSIONS

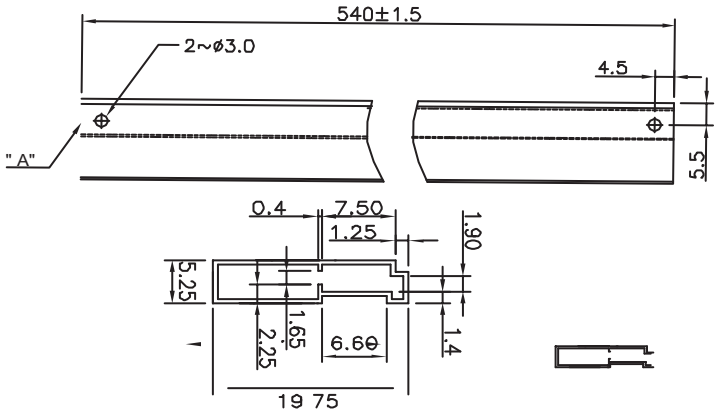
TO-252



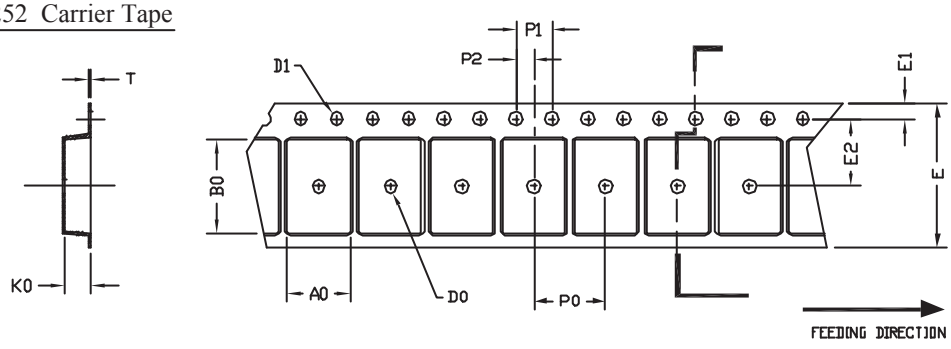
SYMBOLS	MILLIMETERS		INCHES	
	MIN	MAX	MIN	MAX
A	2.210	2.387	0.087	0.094
C2	0.483	0.584	0.019	0.023
b	0.814	0.889	0.032	0.035
b2	0.864	1.092	0.034	0.043
b3	5.232	5.436	0.206	0.214
L2	0.508	REF.	0.020	REF.
D	6.000	6.200	0.236	0.244
E	6.400	6.604	0.252	0.260
E1	4.902	5.004	0.193	0.197
e	2.290	BSC	0.090	BSC
H	9.601	10.210	0.378	0.402
A1	0.010	0.127	0.0004	0.005
L4	0.066	0.940	0.026	0.037
L	1.397	1.651	0.055	0.065
L1	2.743	REF.	0.108	REF.
L3	1.100	REF.	0.043	REF.

TO251 Tube/TO-252 Tape and Reel Data

TO-251 Tube



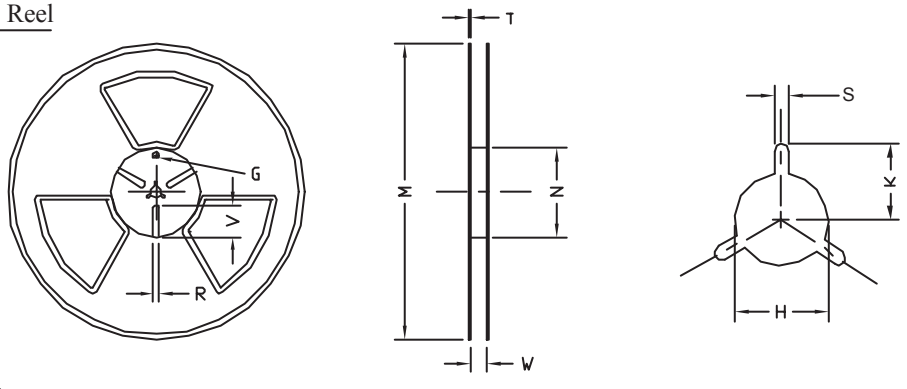
TO-252 Carrier Tape



UNIT:㎜

PACKAGE	A0	B0	K0	D0	D1	E	E1	E2	P0	P1	P2	T
TO-252 (16 ㎜)	6.80 ±0.1	10.3 ±0.1	2.50 ±0.1	ϕ2	ϕ1.5 +0.1 -0	16.0 0.3±	1.75 0.1±	7.5 ±0.15	8.0 ±0.1	4.0 ±0.1	2.0 ±0.15	0.3 ±0.05

TO-252 Reel



UNIT:㎜

TAPE SIZE	REEL SIZE	M	N	W	T	H	K	S	G	R	V
16 ㎜	ϕ 330	ϕ330 ± 0.5	ϕ97 ± 1.0	17.0 +1.5 -0	2.2	ϕ13.0 + 0.5 - 0.2	10.6	2.0 ±0.5	---	---	---