N-Channel Enhancement Mode MOSFET

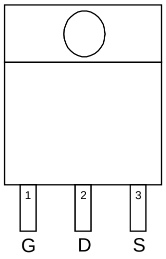
Features

- 30V / 80A , $R_{DS(ON)}$= 4mΩ(typ.) @ V_{GS}= 10V
  $R_{DS(ON)}$= 7mΩ(typ.) @ V_{GS}= 4.5V
- Super High Dense Advanced Cell Design for Extremely Low $R_{DS(ON)}$
- Reliable and Rugged
- TO-220, TO-252 and TO-263 Packages

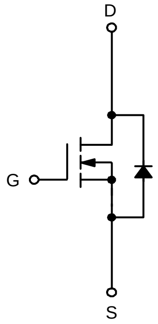
Applications

- Power Management in Desktop Computer or DC/DC Converters.

Pin Description



Top View of TO-220, TO-252 and TO-263



N-Channel MOSFET

Ordering and Marking Information

APM3005N □□-□□

Handling Code
Temp. Range
Package Code

Package Code
F : TO-220 U : TO-252 G : TO-263
Operating Junction Temp. Range
C : -55 to 125°C
Handling Code
TU : Tube
TR : Tape & Reel

APM3005N :

APM3005N
XXXXX

XXXXX - Date Code

Absolute Maximum Ratings (T$_A$ = 25°C unless otherwise noted)

Symbol	Parameter	Rating	Unit
V_{DSS}	Drain-Source Voltage	30	V
V_{GSS}	Gate-Source Voltage	±20	
I_D^*	Maximum Drain Current – Continuous	80	A
I_{DM}	Maximum Drain Current – Pulsed	160	

Absolute Maximum Ratings (Cont.) (T_A = 25°C unless otherwise noted)

Symbol	Parameter			Rating	Unit
P_D	Maximum Power Dissipation	T_A=25°C	TO-252	50	W
			TO-263	62.5	
		T_A=100°C	TO-252	20	W
			TO-263	25	
T_J,T_{STG}	Maximum Operating and Storage Junction Temperature			-55 to 150	°C
$R_{\theta JA}$	Thermal Resistance – Junction to Ambient		TO-252	50	°C/W
			TO-263	60	
$R_{\theta JC}$	Thermal Resistance – Junction to Case		TO-252	2.5	°C/W
			TO-263	2	

* Surface Mounted on FR4 Board, $t \leq 10$ sec.

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

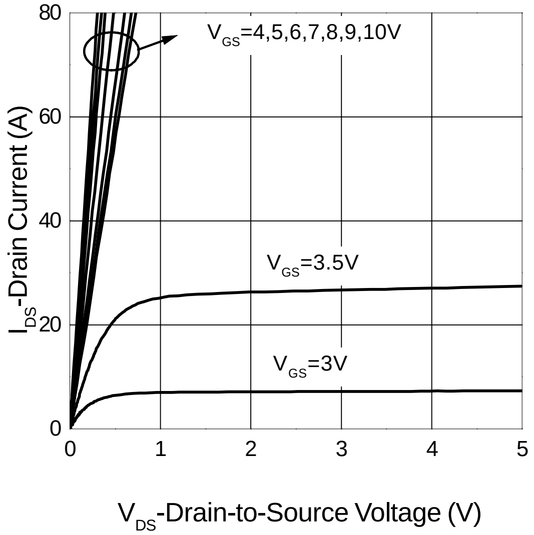
Symbol	Parameter	Test Condition	APM3005N			Unit
			Min.	Typ.	Max.	
Static						
BV_{DSS}	Drain-Source Breakdown Voltage	V_{GS}=0V , I_{DS}=250µA	30			V
I_{DSS}	Zero Gate Voltage Drain Current	V_{DS}=24V , V_{GS}=0V			1	µA
$V_{GS(th)}$	Gate Threshold Voltage	V_{DS}=V_{GS} , I_{DS}=250µA	1	1.5	2	V
I_{GSS}	Gate Leakage Current	V_{GS}=±20V , V_{DS}=0V			±100	nA
$R_{DS(ON)}{}^a$	Drain-Source On-state Resistance	V_{GS}=10V , I_{DS}=80A		4	5.4	mΩ
		V_{GS}=4.5V , I_{DS}=70A		7	8	
$V_{SD}{}^a$	Diode Forward Voltage	I_{SD}=30A , V_{GS}=0V		0.85	1.3	V
Dynamic^b						
Q_g	Total Gate Charge	V_{DS}=15V , I_{DS}= 80A V_{GS}=5V ,		28	32	nC
Q_{gs}	Gate-Source Charge			12.8		
Q_{gd}	Gate-Drain Charge			21.2		
$t_{d(ON)}$	Turn-on Delay Time	V_{DD}=15V , I_{DS}=1A , V_{GEN}=10V , R_G=0.2Ω		13	20	ns
T_r	Turn-on Rise Time			9	15	
$t_{d(OFF)}$	Turn-off Delay Time			43	66	
T_f	Turn-off Fall Time			14	28	
C_{iss}	Input Capacitance	V_{GS}=0V V_{DS}=15V Frequency=1.0MHz		4700		pF
C_{oss}	Output Capacitance			930		
C_{rss}	Reverse Transfer Capacitance			280		

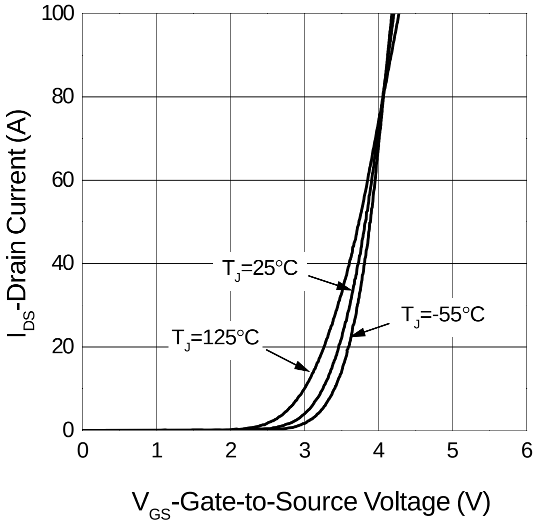
Notes

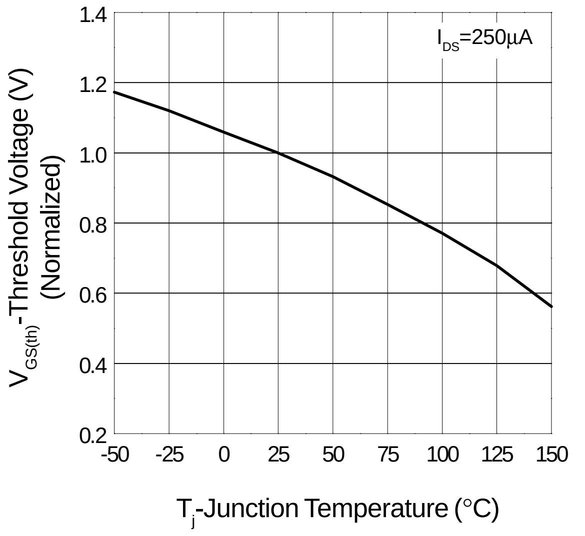
[a] : Pulse test ; pulse width ≤300µs, duty cycle ≤ 2%

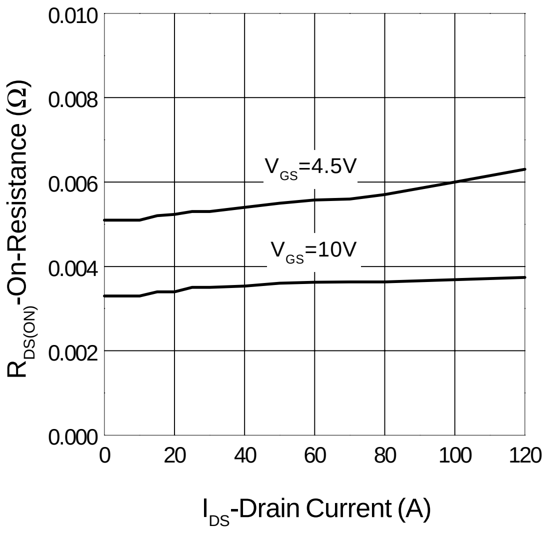
[b] : Guaranteed by design, not subject to production testing

Typical Characteristics


Output Characteristics

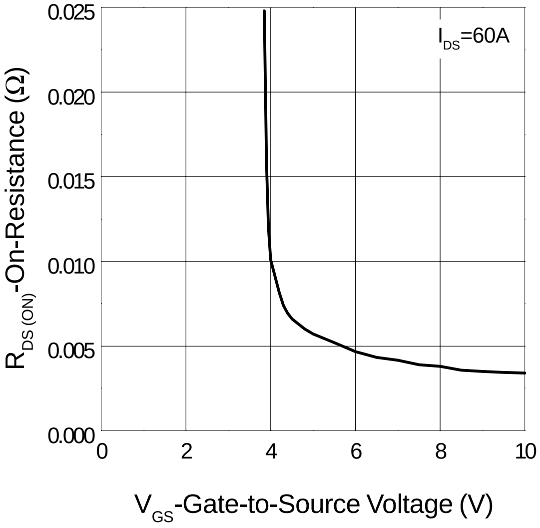

Transfer Characteristics


Threshold Voltage vs. Junction Temperature

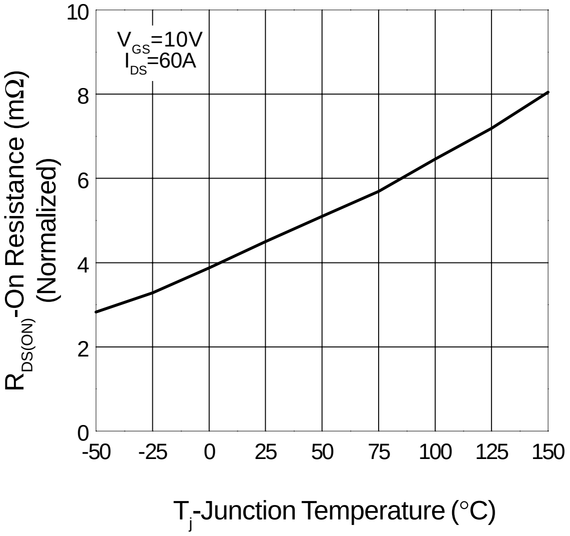

On-Resistance vs. Drain Current

Typical Characteristics (Cont.)

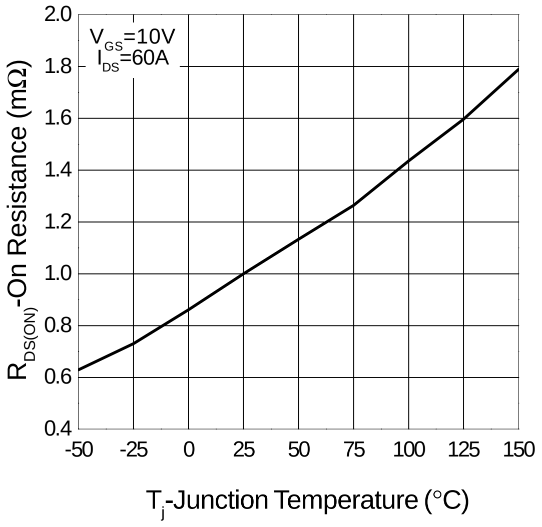
On-Resistance vs. Gate-to-Source Voltage



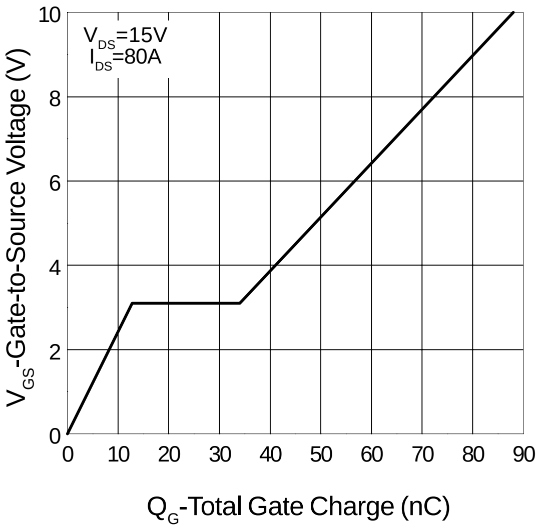
On-Resistaence vs. Junction Temperature



On-Resistaence vs. Junction Temperature

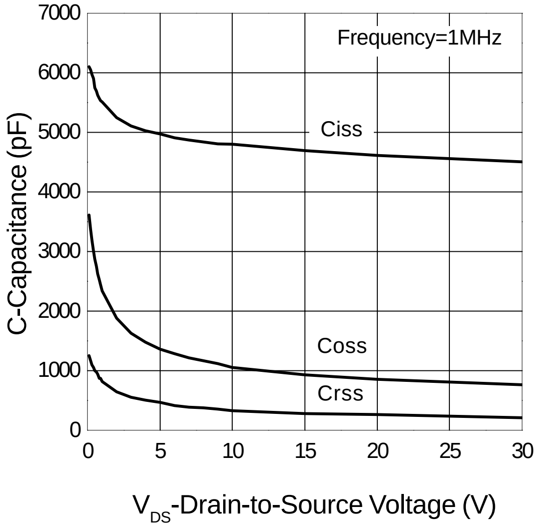


Gate Charge

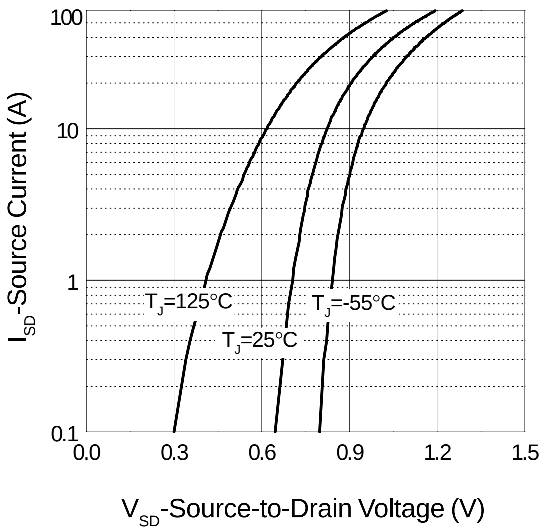


Typical Characteristics (Cont.)

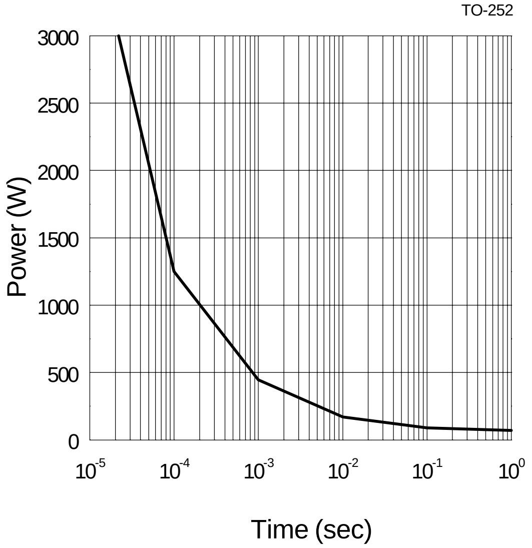
Capacitance Characteristics



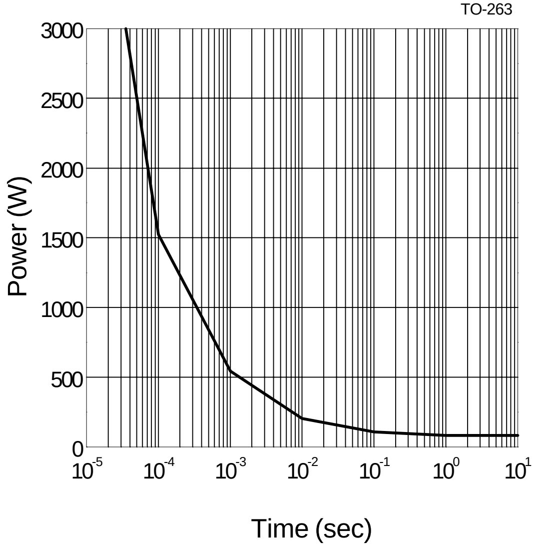
Source-Drain Diode Forward Voltage



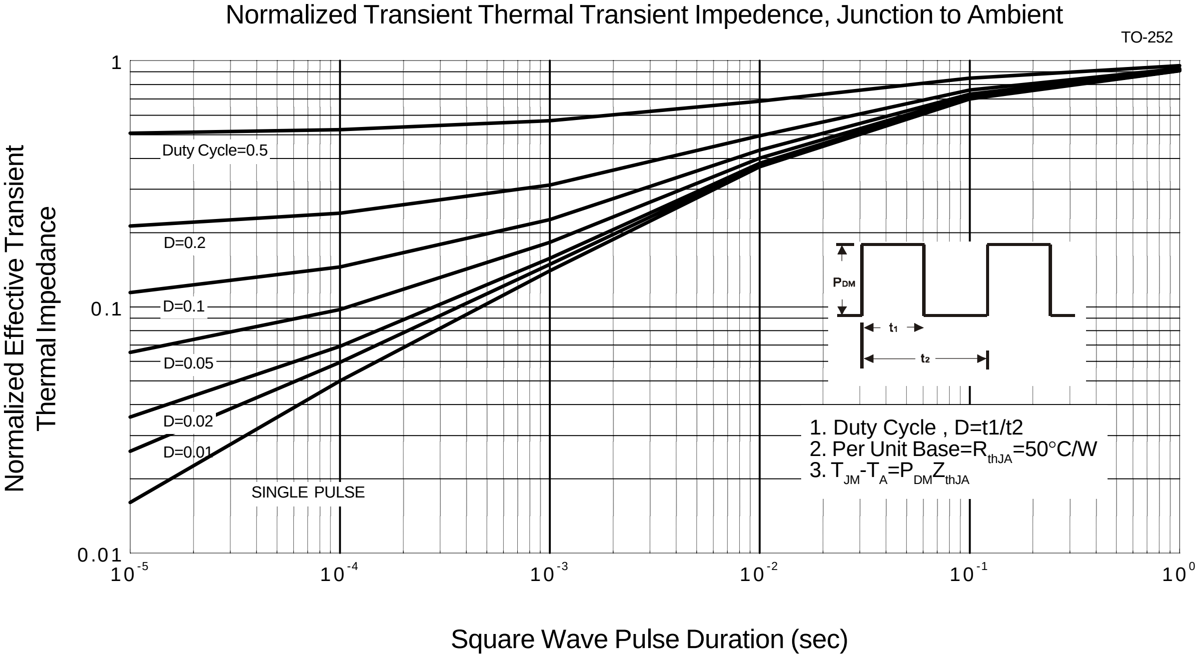
Single Pulse Power

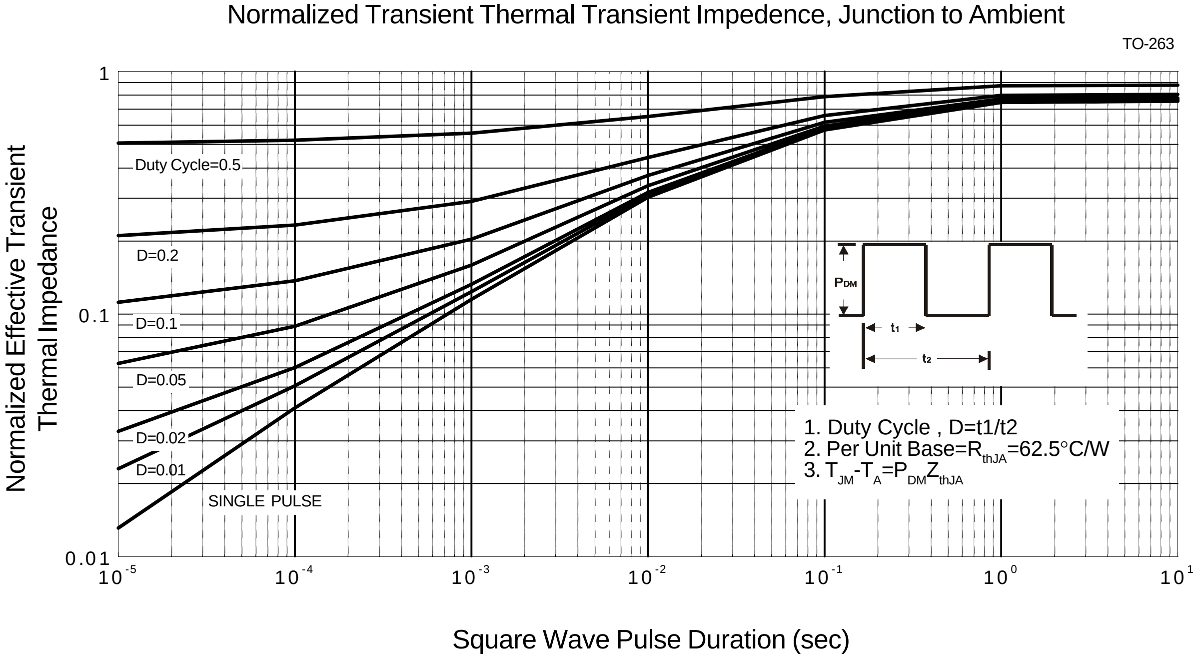


Single Pulse Power



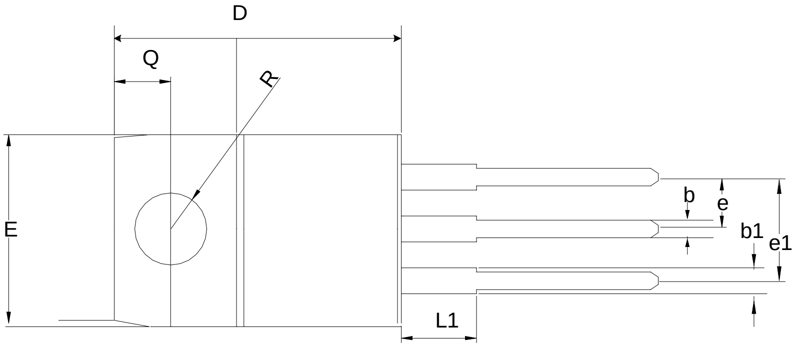
Typical Characteristics (Cont.)

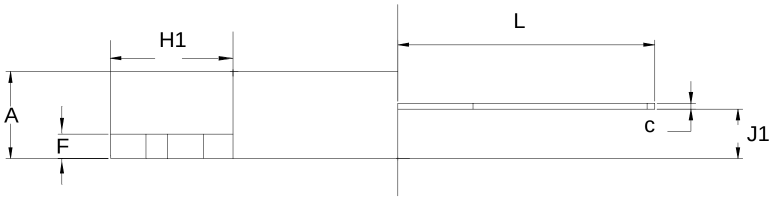




Package Information

TO-220 (Reference JEDEC Registration TO-220)

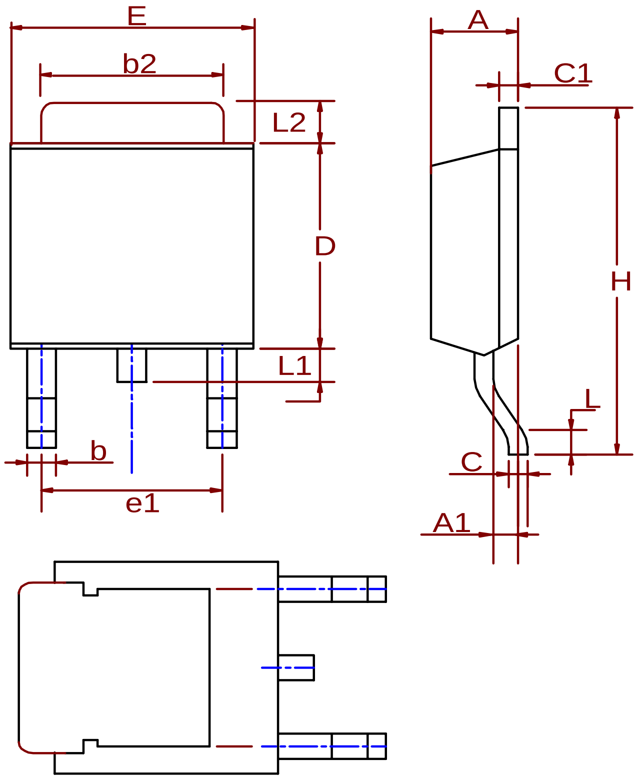




Dim	Millimeters		Inches	
	Min.	Max.	Min.	Max.
A	3.56	4.83	0.140	0.190
b1	1.14	1.78	0.045	0.070
b	0.51	1.14	0.020	0.045
c	0.31	1.14	0.012	0.045
D	14.23	16.51	0.560	0.650
e	2.29	2.79	0.090	0.110
e1	4.83	5.33	0.190	0.210
E	9.65	10.67	0.380	0.420
F	0.51	1.40	0.020	0.055
H1	5.84	6.86	0.230	0.270
J1	2.03	2.92	0.080	0.115
L	12.7	14.73	0.500	0.580
L1	3.65	6.35	0.143	0.250
R	3.53	4.09	0.139	0.161
Q	2.54	3.43	0.100	0.135

Package Informaion (Cont.)

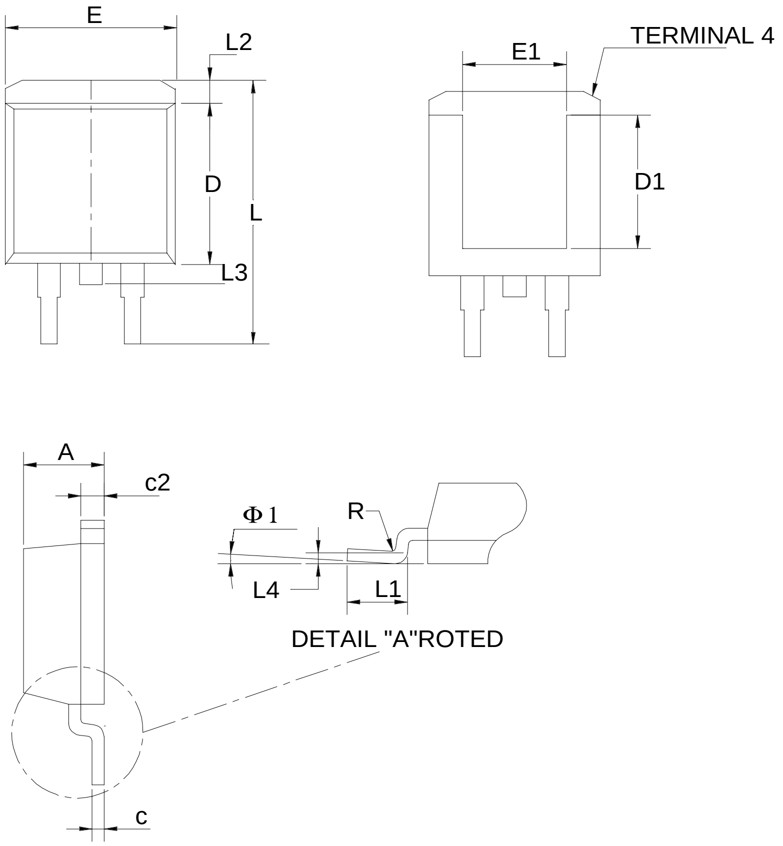
TO-252(Reference JEDEC Registration TO-252)



Dim	Millimeters		Inches	
	Min.	Max.	Min.	Max.
A	2.18	2.39	0.086	0.094
A1	0.89	1.27	0.035	0.050
b	0.508	0.89	0.020	0.035
b2	5.207	5.461	0.205	0.215
C	0.46	0.58	0.018	0.023
C1	0.46	0.58	0.018	0.023
D	5.334	6.22	0.210	0.245
E	6.35	6.73	0.250	0.265
e1	3.96	5.18	0.156	0.204
H	9.398	10.41	0.370	0.410
L	0.51		0.020	
L1	0.64	1.02	0.025	0.040
L2	0.89	2.032	0.035	0.080

Package Information (Cont.)

TO-263 (Reference JEDEC Registration TO-263)



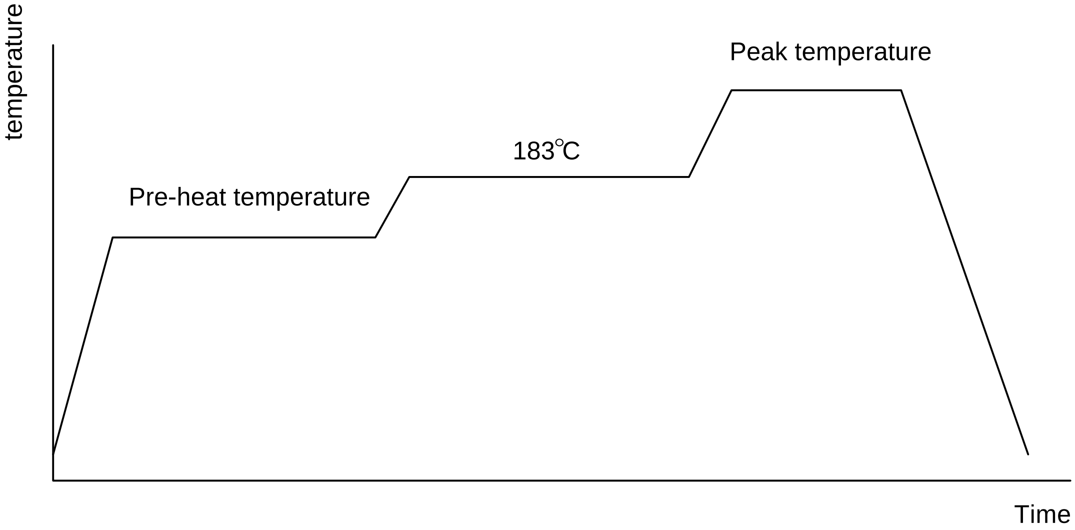
Dim	Millimeters		Inches	
	Min.	Max.	Min.	Max.
A	4.06	4.83	0.160	0.190
b	0.51	1.016	0.02	0.040
b2	1.14	1.651	0.045	0.065
c	0.38 TYP.		0.015 TYP.	
c2	1.14	1.40	0.045	0.055
D	8.64	9.65	0.340	0.380
E	9.65	10.54	0.380	0.415
L	14.60	15.88	0.575	0.625
L1	2.24	2.84	0.090	0.110
L2	1.02	2.92	0.040	0.112
L3	1.20	1.78	0.050	0.070

Physical Specifications

Terminal Material	Solder-Plated Copper (Solder Material : 90/10 or 63/37 SnPb)
Lead Solderability	Meets EIA Specification RSI86-91, ANSI/J-STD-002 Category 3.

Reflow Condition (IR/Convection or VPR Reflow)

Reference JEDEC Standard J-STD-020A APRIL 1999



Classification Reflow Profiles

	Convection or IR/ Convection	VPR
Average ramp-up rate(183 ℃ to Peak)	3 °C/second max.	10 ℃ /second max.
Preheat temperature 125 ± 25 ℃)	120 seconds max.	
Temperature maintained above 183 ℃	60 ~ 150 seconds	
Time within 5 ℃ of actual peak temperature	10 ~ 20 seconds	60 seconds
Peak temperature range	220 +5/-0 °C or 235 +5/-0 °C	215~ 219 ℃ or 235 +5/-0 °C
Ramp-down rate	6 °C /second max.	10 ℃ /second max.
Time 25 ℃ to peak temperature	6 minutes max.	

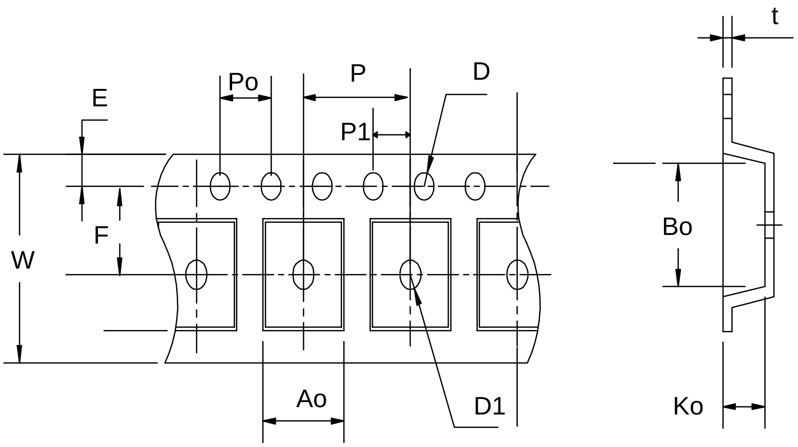
Package Reflow Conditions

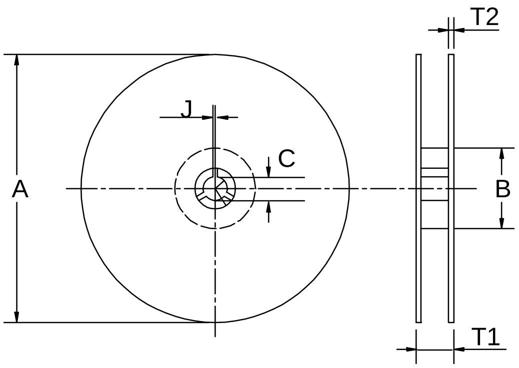
pkg. thickness ≥ 2.5mm and all bags	**pkg. thickness < 2.5mm and pkg. volume ≥ 350 mm**	**pkg. thickness < 2.5mm and pkg. volume <**
Convection 220 +5/-0 °C		Convection 235 +5/-0 °C
VPR 215-219 °C		VPR 235 +5/-0 °C
IR/Convection 220 +5/-0 °C		IR/Convection 235 +5/-0 °C

Reliability test program

Test item	Method	Description
SOLDERABILITY	MIL-STD-883D-2003	245°C,5 SEC
HOLT	MIL-STD 883D-1005.7	1000 Hrs Bias @ 125°C
PCT	JESD-22-B, A102	168 Hrs, 100% RH, 121°C
TST	MIL-STD 883D-1011.9	-65°C ~ 150°C, 200 Cycles

Carrier Tape & Reel Dimension





Application	A	B	C	J	T1	T2	W	P	E
TO-252	330 ±3	100 ± 2	13 ± 0. 5	2 ± 0.5	16.4 + 0.3 -0.2	2.5± 0.5	16+ 0.3 - 0.1	8 ± 0.1	1.75± 0.1
	F	D	D1	Po	P1	Ao	Bo	Ko	t
	7.5 ± 0.1	1.5 +0.1	1.5± 0.25	4.0 ± 0.1	2.0 ± 0.1	6.8 ± 0.1	10.4± 0.1	2.5± 0.1	0.3±0.05
Application	A	B	C	J	T1	T2	W	P	E
TO-263	380±3	80 ± 2	13 ± 0. 5	2 ± 0.5	24 ± 4	2± 0.3	24 + 0.3 - 0.1	16 ± 0.1	1.75± 0.1
	F	D	D1	Po	P1	Ao	Bo	Ko	t
	11.5 ± 0.1	1.5 +0.1	1.5± 0.25	4.0 ± 0.1	2.0 ± 0.1	10.8 ± 0.1	16.1± 0.1	5.2± 0.1	0.35±0.013

(mm)

Cover Tape Dimensions

Application	Carrier Width	Cover Tape Width	Devices Per Reel
TO- 252	16	13.3	2500
TO- 263	24	21.3	1000

Customer Service

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