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N-Channel Enhancement Mode MOSFET

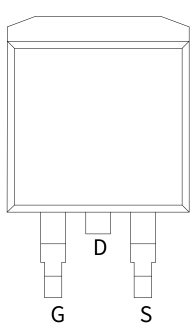
Features

- 30V/12A,
  $R_{DS(ON)}$=75mΩ (typ.) @ V_{GS}=10V
  $R_{DS(ON)}$=100mΩ (typ.) @ V_{GS}=4.5V
- Super High Dense Cell Design
- Reliable and Rugged
- Lead Free Available (RoHS Compliant)

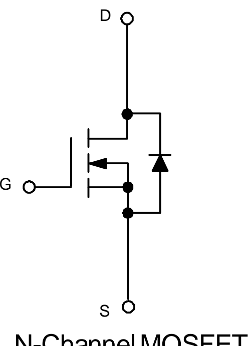
Applications

- Power Management in Desktop Computer or DC/DC Converters

Pin Description

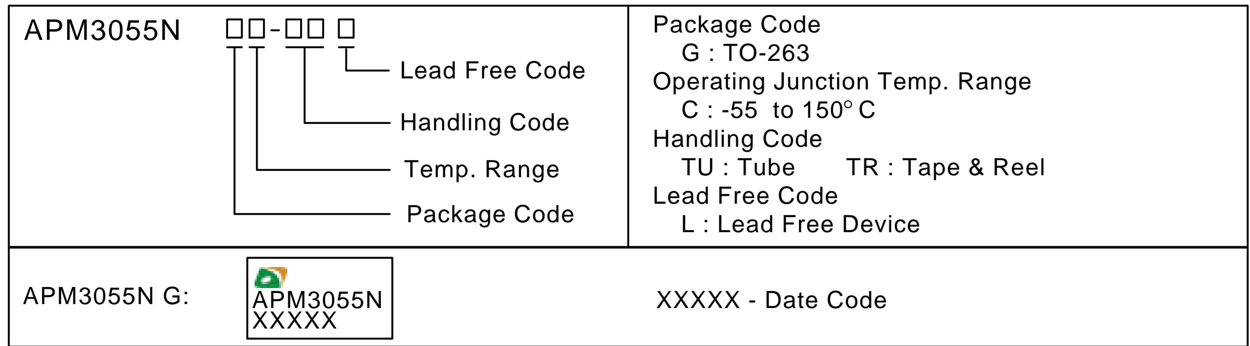


Top View of TO-263



N-Channel MOSFET

Ordering and Marking Information



APM3055N □□-□□ □ (Lead Free Code; Handling Code; Temp. Range; Package Code)	Package Code G : TO-263 Operating Junction Temp. Range C : -55 to 150° C Handling Code TU : Tube TR : Tape & Reel Lead Free Code L : Lead Free Device
APM3055N G: APM3055N XXXXX	XXXXX - Date Code

Note: ANPEC lead-free products contain molding compounds and 100% matte tin plate termination finish; which are fully compliant with RoHS and compatible with both SnPb and lead-free soldiering operations. ANPEC lead-free products meet or exceed the lead-free requirements of IPC/JEDEC J STD-020C for MSL classification at lead-free peak reflow temperature.

ANPEC reserves the right to make changes to improve reliability or manufacturability without notice, and advise customers to obtain the latest version of relevant information to verify before placing orders.

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Absolute Maximum Ratings

Symbol	Parameter		Rating	Unit
Common Ratings (T_A=25°C Unless Otherwise Noted)				
V_{DSS}	Drain-Source Voltage		30	V
V_{GSS}	Gate-Source Voltage		±20	
T_J	Maximum Junction Temperature		150	°C
T_{STG}	Storage Temperature Range		-55 to 150	
I_S	Diode Continuous Forward Current	T_C=25°C	8	A
Mounted on Large Heat Sink				
I_{DP}	300µs Pulse Drain Current Tested	T_C=25°C	48	A
		T_C=100°C	48	
I_D	Continuous Drain Current	T_C=25°C	12*	
		T_C=100°C	12	
P_D	Maximum Power Dissipation	T_C=25°C	62.5	W
		T_C=100°C	25	
$R_{\theta JC}$	Thermal Resistance-Junction to Case		2	°C/W
Mounted on PCB of 1in^2 pad area				
I_{DP}	300µs Pulse Drain Current Tested	T_A=25°C	16	A
		T_A=100°C	10	
I_D	Continuous Drain Current	T_A=25°C	4.3	
		T_A=100°C	3.1	
P_D	Maximum Power Dissipation	T_A=25°C	2.8	W
		T_A=100°C	1.1	
$R_{\theta JA}$	Thermal Resistance-Junction to Ambient		45	°C/W
Mounted on PCB of Minimum Footprint				
I_{DP}	300µs Pulse Drain Current Tested	T_A=25°C	14	A
		T_A=100°C	8	
I_D	Continuous Drain Current	T_A=25°C	3.5	
		T_A=100°C	2	
P_D	Maximum Power Dissipation	T_A=25°C	2	W
		T_A=100°C	0.8	
$R_{\theta JA}$	Thermal Resistance-Junction to Ambient		62.5	°C/W

Notes:
* Current limited by bond wire.

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Electrical Characteristics

(T_A = 25°C unless otherwise noted)

Symbol	Parameter	Test Condition	APM3055NG			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
		T_J=85°C			30	
$V_{GS(th)}$	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}=12A		75	100	mΩ
		V_{GS}=4.5V, I_{DS}=6A		100	200	
Diode						
V_{SD} [a]	Diode Forward Voltage	I_{SD}=3A, V_{GS}=0V		0.8	1.3	V
t_{rr}	Reverse Recovery Time	I_{DS}=12A, dI_{SD}/dt=100A/µs		20		ns
Q_{rr}	Reverse Recovery Charge			11		nC
Dynamic [b]						
R_G	Gate Resistance	V_{GS}=0V,V_{DS}=0V,F=1MHz		2.2		Ω
C_{iss}	Input Capacitance	V_{GS}=0V, V_{DS}=15V, Frequency=1.0MHz		390		pF
C_{oss}	Output Capacitance			65		
C_{rss}	Reverse Transfer Capacitance			35		
$t_{d(ON)}$	Turn-on Delay Time	V_{DD}=15V, R_L=15Ω, I_{DS}=1A, V_{GEN}=10V, R_G=6Ω		3	6	ns
T_r	Turn-on Rise Time			10	19	
$t_{d(OFF)}$	Turn-off Delay Time			15	28	
T_f	Turn-off Fall Time			2	5	
Gate Charge [b]						
Q_g	Total Gate Charge	V_{DS}=15V, V_{GS}=10V, I_{DS}=12A		7.7	11	nC
Q_{gs}	Gate-Source Charge			1.7		
Q_{gd}	Gate-Drain Charge			1.1		

Notes:

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

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

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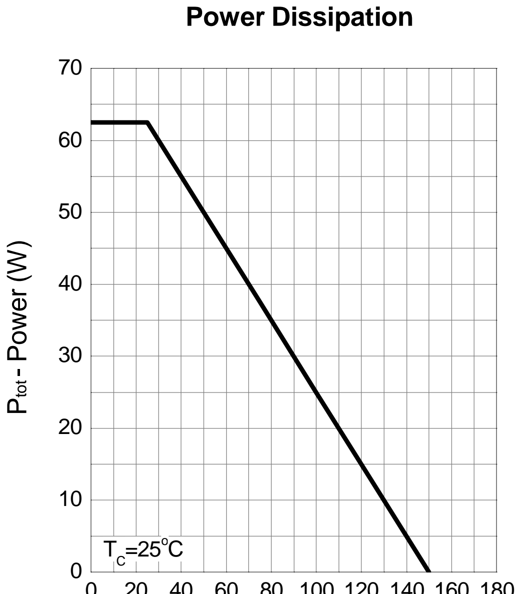
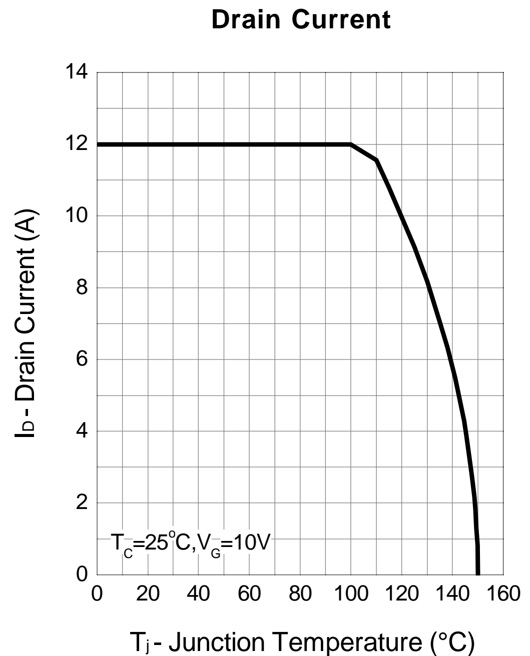
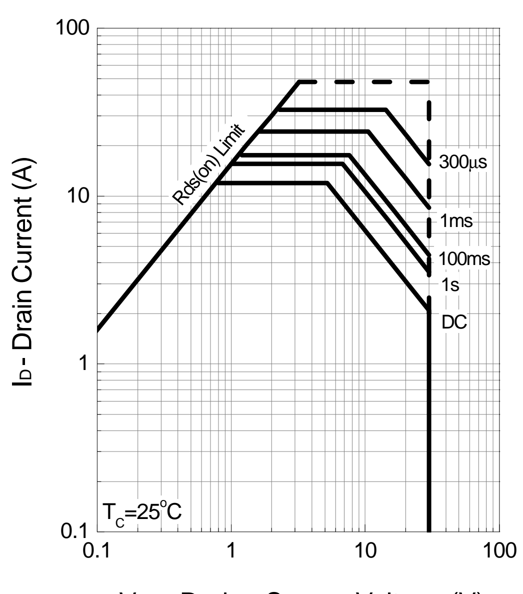
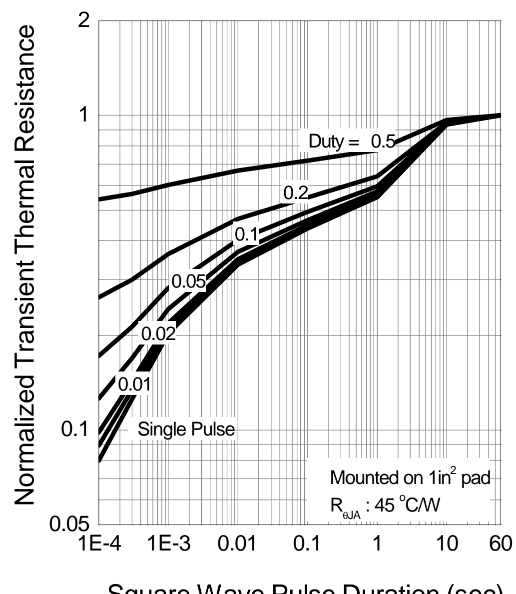
Typical Characteristics









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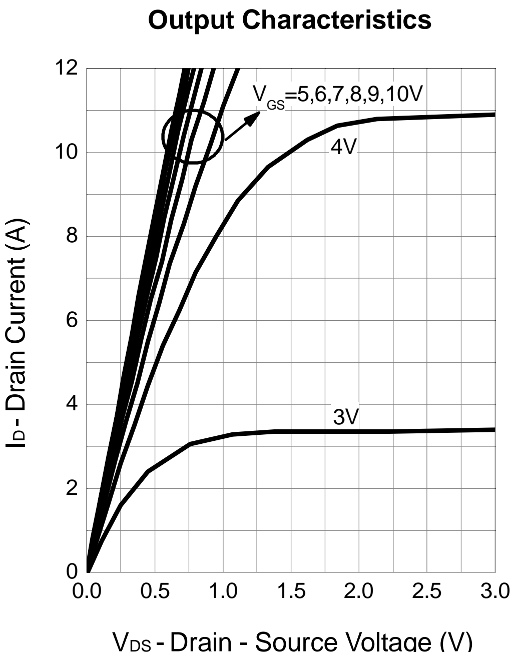
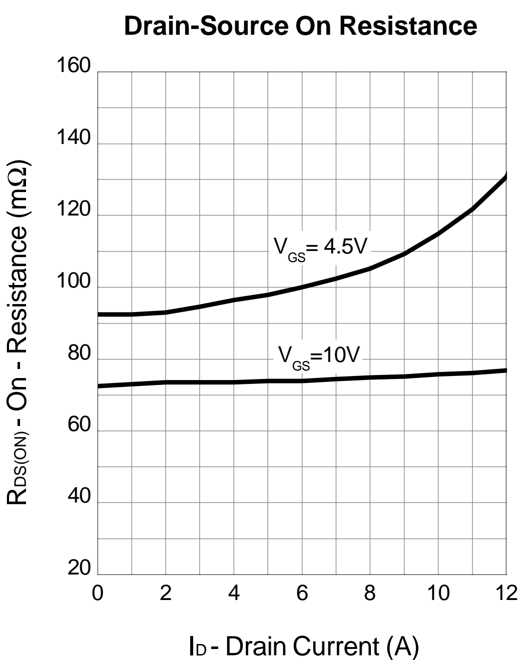
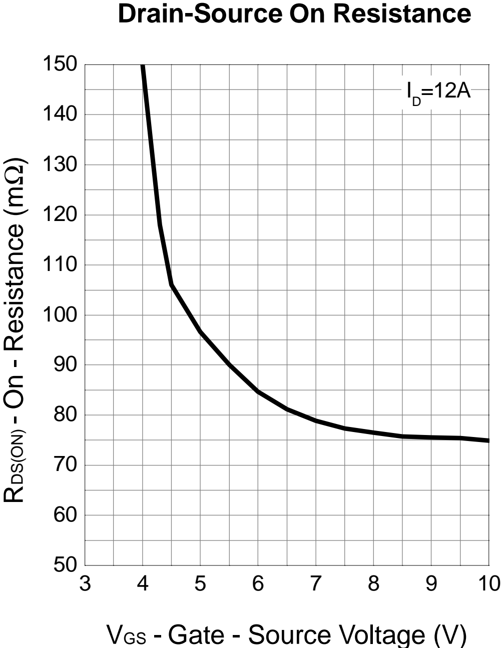
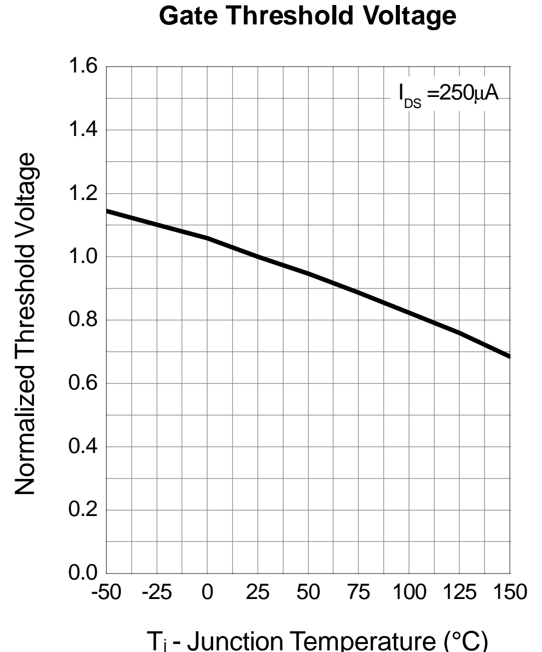
Typical Characteristics (Cont.)









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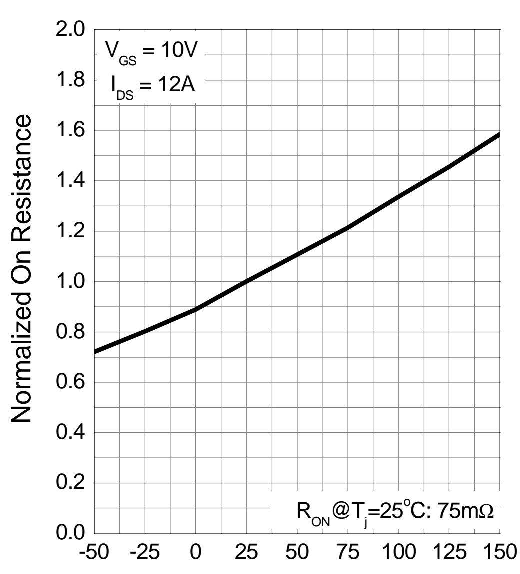
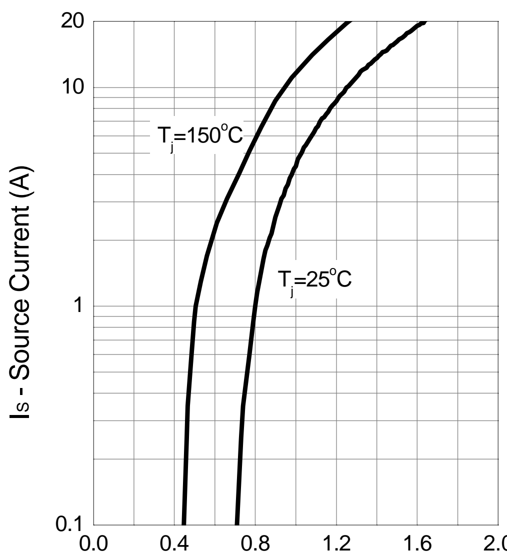
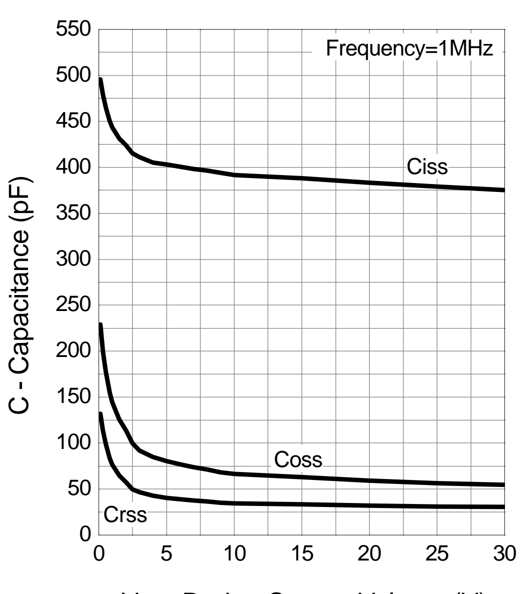
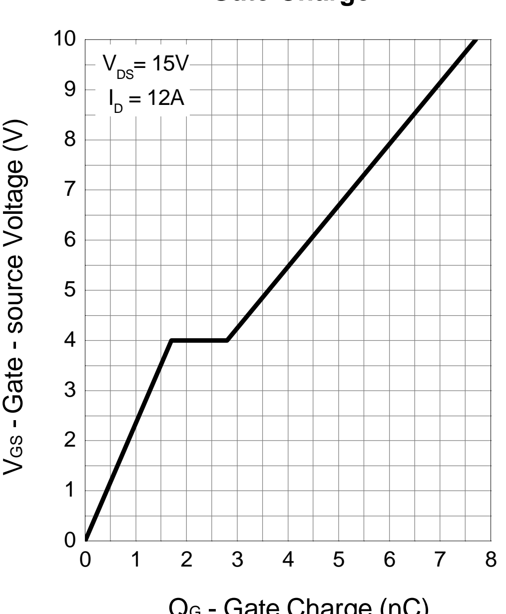
Typical Characteristics (Cont.)









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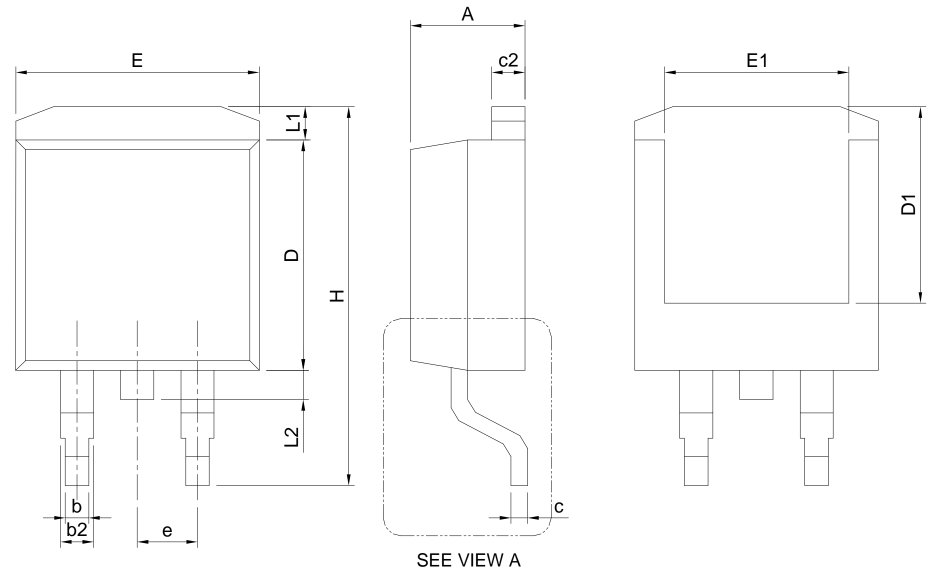
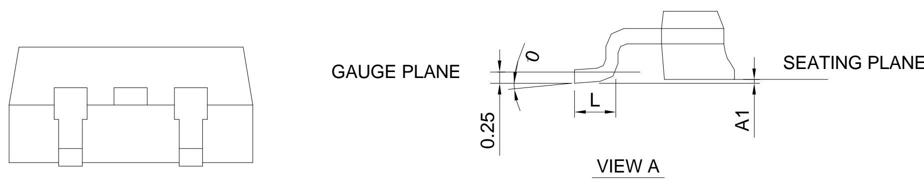
Packaging Information

TO-263 (Reference JEDEC Registration TO-263)





Dim	Millimeters		Inches	
	Min.	Max.	Min.	Max.
A	4.06	4.83	0.160	0.190
A1	0.00	0.25	0.000	0.010
b	0.51	0.99	0.020	0.039
b2	1.14	1.78	0.045	0.070
c	0.38	0.74	0.015	0.029
c2	1.14	1.65	0.045	0.065
D	8.38	9.65	0.330	0.380
D1	6.86	-	0.270	-
E	9.65	11.43	0.380	0.450
E1	6.22	-	0.245	-
e	2.54 BSC		0.100 BSC	
L	1.78	2.79	0.070	0.110
L1	-	1.68	-	0.066
L2	-	1.78	-	0.070
θ	0°	8°	0°	8°

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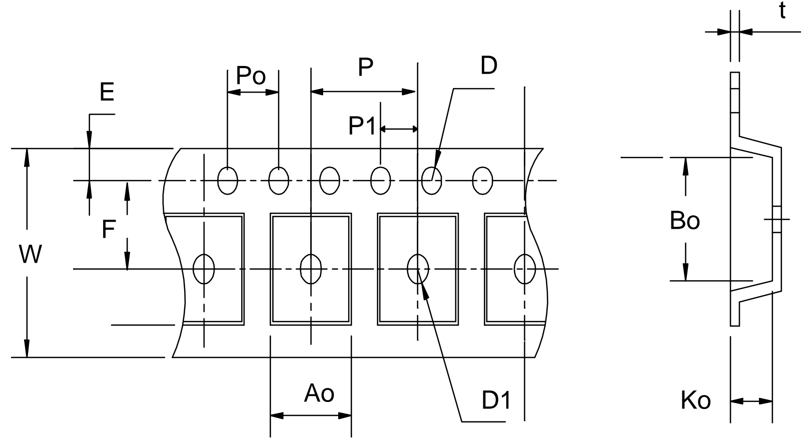
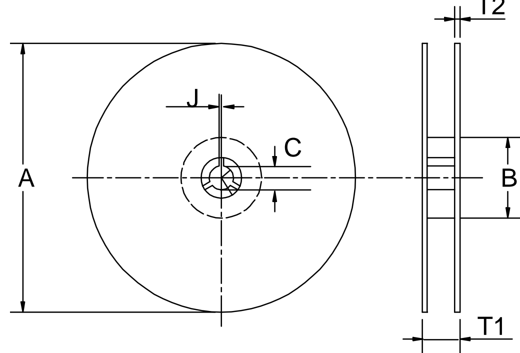
Carrier Tape & Reel Dimensions





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- 263	24	21.3	800

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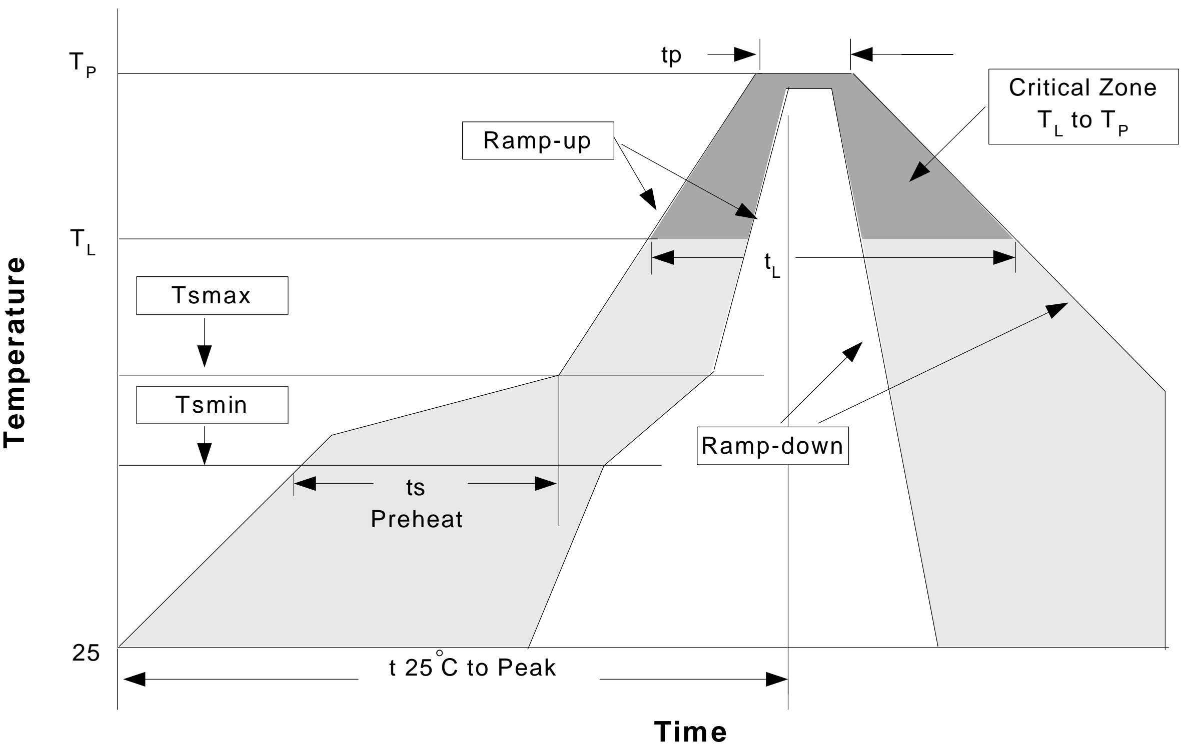
Physical Specifications

Terminal Material	Solder-Plated Copper (Solder Material : 90/10 or 63/37 SnPb), 100%Sn
Lead Solderability	Meets EIA Specification RSI86-91, ANSI/J-STD-002 Category 3.

Reflow Condition (IR/Convection or VPR Reflow)



Classificatin Reflow Profiles

Profile Feature	Sn-Pb Eutectic Assembly	Pb-Free Assembly
Average ramp-up rate (T_L to T_P)	3°C/second max.	3°C/second max.
Preheat - Temperature Min (Tsmin) - Temperature Max (Tsmax) - Time (min to max) (ts)	100°C 150°C 60-120 seconds	150°C 200°C 60-180 seconds
Time maintained above: - Temperature (T_L) - Time (t_L)	183°C 60-150 seconds	217°C 60-150 seconds
Peak/Classificatioon Temperature (Tp)	See table 1	See table 2
Time within 5°C of actual Peak Temperature (tp)	10-30 seconds	20-40 seconds
Ramp-down Rate	6°C/second max.	6°C/second max.
Time 25°C to Peak Temperature	6 minutes max.	8 minutes max.

Notes: All temperatures refer to topside of the package .Measured on the body surface.

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Classificatin Reflow Profiles(Cont.)

Table 1. SnPb Entectic Process – Package Peak Reflow Temperatures

Package Thickness	Volume mm^3 <350	Volume mm^3 ^{3}350
<2.5 mm	240 +0/-5°C	225 +0/-5°C
≥2.5 mm	225 +0/-5°C	225 +0/-5°C

Table 2. Pb-free Process – Package Classification Reflow Temperatures

Package Thickness	Volume mm^3 <350	Volume mm^3 350-2000	Volume mm^3 >2000
<1.6 mm	260 +0°C*	260 +0°C*	260 +0°C*
1.6 mm – 2.5 mm	260 +0°C*	250 +0°C*	245 +0°C*
≥2.5 mm	250 +0°C*	245 +0°C*	245 +0°C*

*Tolerance: The device manufacturer/supplier **shall** assure process compatibility up to and including the stated classification temperature (this means Peak reflow temperature +0°C. For example 260°C+0°C) at the rated MSL level.

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

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