

## P-Channel Enhancement Mode Power MOSFET

### Description

The RM70P30DF uses advanced trench technology to provide excellent  $R_{DS(ON)}$ , low gate charge. This device is suitable for use as a load switch or in PWM applications.

### General Features

- $V_{DS} = -30V, I_D = -70A$   
 $R_{DS(ON)} < 12m\Omega @ V_{GS} = -4.5V$   
 $R_{DS(ON)} < 7.2m\Omega @ V_{GS} = -10V$
- High Power and current handling capability
- Lead free product is acquired
- Surface mount package

### Application

- PWM applications
- Load switch
- Power management
- Halogen-free

### Package Marking and Ordering Information

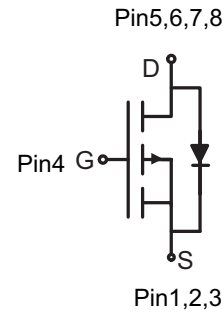
Device Marking	Device	Device Package	Reel Size	Tape width	Quantity
A3031	RM70P30DF	DFN5X6-8L	Ø330mm	12mm	2500 units

### Absolute Maximum Ratings ( $T_A = 25^\circ C$ unless otherwise noted)

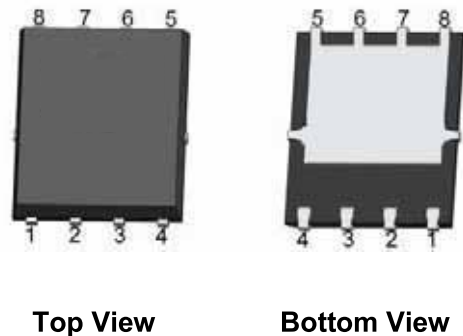
Parameter	Symbol	Limit	Unit
Drain-Source Voltage	$V_{DS}$	-30	V
Gate-Source Voltage	$V_{GS}$	$\pm 20$	V
Drain Current-Continuous	$I_D$	-70	A
Drain Current-Continuous ( $T_C = 100^\circ C$ )	$I_D(100^\circ C)$	-50	A
Drain Current-Pulsed <sup>(Note 1)</sup>	$I_{DM}$	-200	A
Maximum Power Dissipation	$P_D$	90	W
Operating Junction and Storage Temperature Range	$T_J, T_{STG}$	-55 To 175	$^\circ C$

### Thermal Characteristic

Thermal Resistance, Junction-to-Case <sup>(Note 2)</sup>	$R_{\theta JC}$	1.6	$^\circ C/W$
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### Schematic diagram



## Electrical Characteristics ( $T_A=25^{\circ}\text{C}$ unless otherwise noted)

Parameter	Symbol	Condition	Min	Typ	Max	Unit
Drain-Source Breakdown Voltage	$BV_{DSS}$	$V_{GS}=0V, I_D=-250\mu A$	-30	-	-	V
Zero Gate Voltage Drain Current	$I_{DSS}$	$V_{DS}=-24V, V_{GS}=0V$	-	-	-1	$\mu A$
Gate-Body Leakage Current	$I_{GSS}$	$V_{GS}=\pm 20V, V_{DS}=0V$	-	-	$\pm 100$	nA
<b>On Characteristics</b> <sup>(Note 3)</sup>						
Gate Threshold Voltage	$V_{GS(th)}$	$V_{DS}=V_{GS}, I_D=-250\mu A,$	-1.2	-	-2.5	V
Drain-Source On-State Resistance	$R_{DS(ON)}$	$V_{GS}=-10V, I_D=-20A$	-	6	7.2	$m\Omega$
		$V_{GS}=-4.5V, I_D=-15A$	-	9.5	12	$m\Omega$
<b>Dynamic Characteristics</b> <sup>(Note 4)</sup>						
Input Capacitance	$C_{ISS}$	$V_{DS}=-25V, V_{GS}=0V,$ $F=1.0MHz$	-	3450	-	PF
Output Capacitance	$C_{OSS}$		-	255	-	PF
Reverse Transfer Capacitance	$C_{RSS}$		-	140	-	PF
<b>Switching Characteristics</b> <sup>(Note 4)</sup>						
Turn-on Delay Time	$t_{d(on)}$	$V_{DD}=-15V, I_D=-20A,$ $V_{GS}=-10V, R_{GEN}=3.3\Omega$	-	17	-	nS
Turn-on Rise Time	$t_r$		-	40	-	nS
Turn-Off Delay Time	$t_{d(off)}$		-	55	-	nS
Turn-Off Fall Time	$t_f$		-	13	-	nS
Total Gate Charge	$Q_g$	$V_{DS}=-15V, I_D=-18A, V_{GS}=-10V$	-	60	-	nC
Gate-Source Charge	$Q_{gs}$		-	9	-	nC
Gate-Drain Charge	$Q_{gd}$		-	15	-	nC
<b>Drain-Source Diode Characteristics</b>						
Diode Forward Voltage <sup>(Note 3)</sup>	$V_{SD}$	$V_{GS}=0V, I_S=-1A$	-	-	-1.2	V

### Notes:

1. Repetitive Rating: Pulse width limited by maximum junction temperature.
2. Surface Mounted on FR4 Board,  $t \leq 10$  sec.
3. Pulse Test: Pulse Width  $\leq 300\mu s$ , Duty Cycle  $\leq 2\%$ .
4. Guaranteed by design, not subject to production

## RATING AND CHARACTERISTICS CURVES (RM70P30DF)

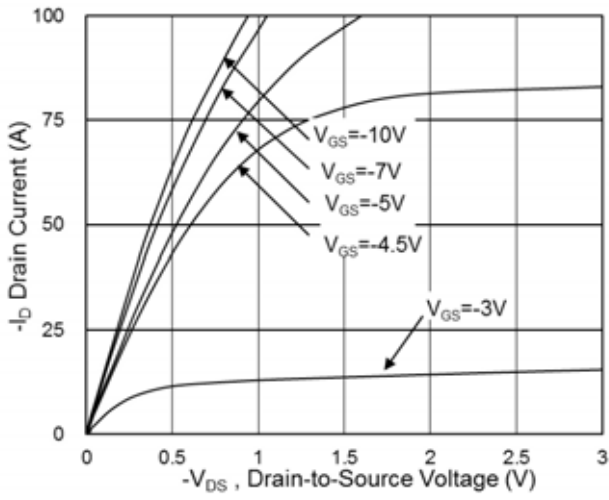


Fig.1 Typical Output Characteristics

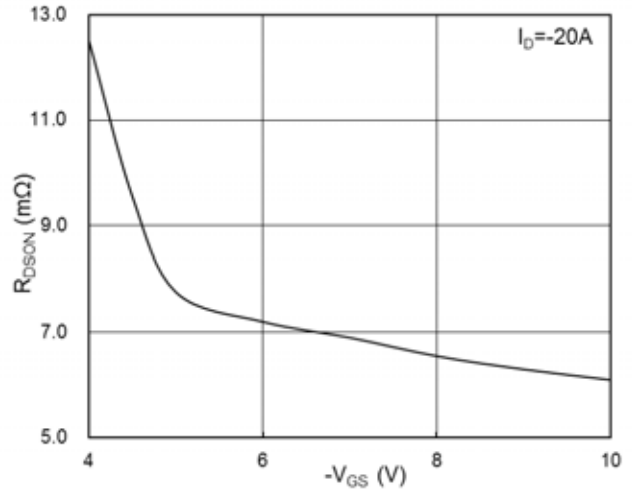


Fig.2 On-Resistance vs. Gate-Source Voltage

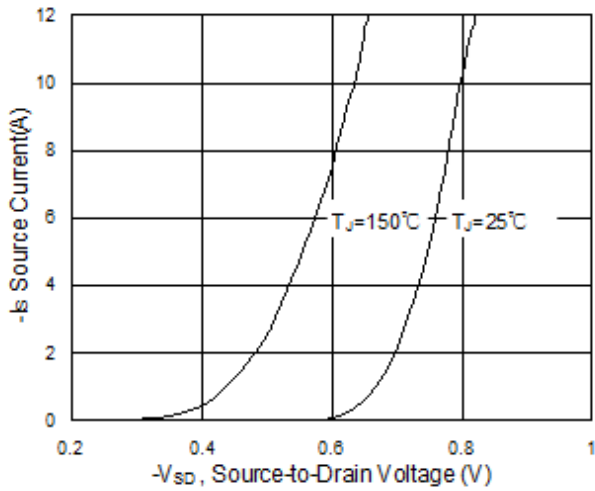


Fig.3 Forward Characteristics of Reverse

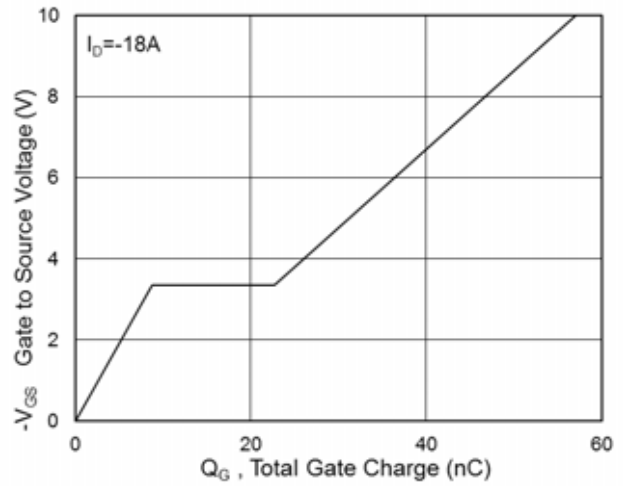


Fig.4 Gate-Charge Characteristics

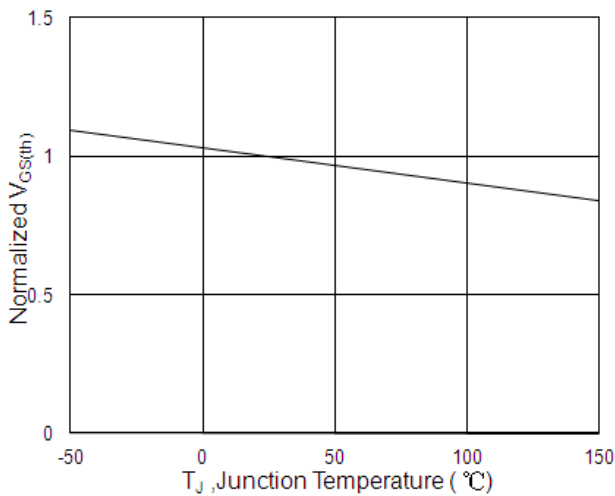


Fig.5 Normalized  $-V_{GS(th)}$  vs.  $T_J$

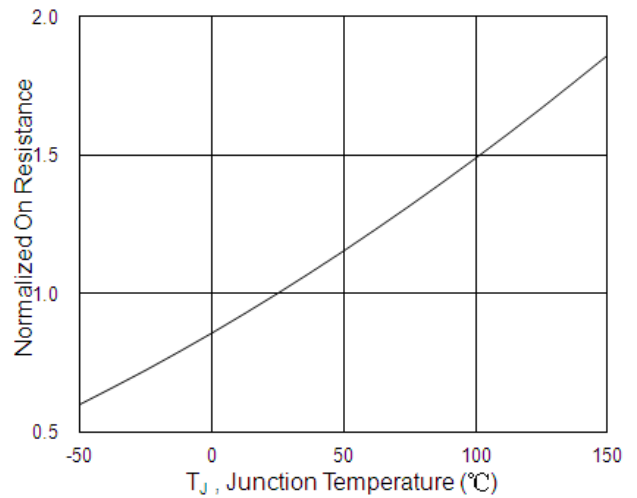
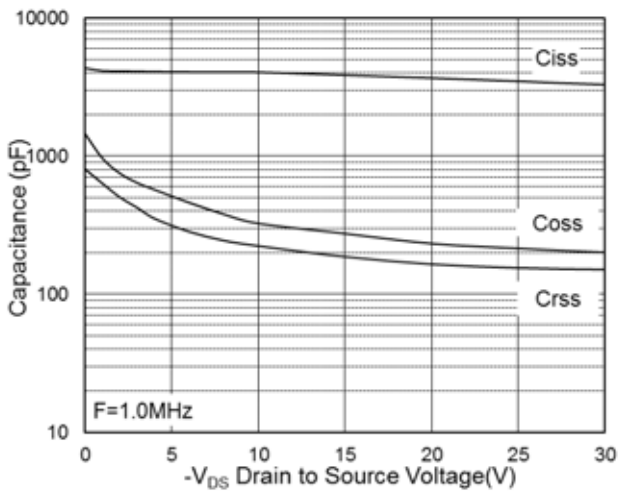
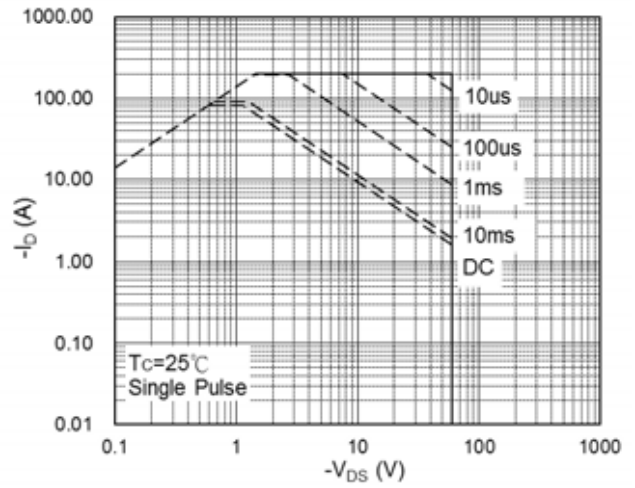


Fig.6 Normalized  $R_{DS(on)}$  vs.  $T_J$

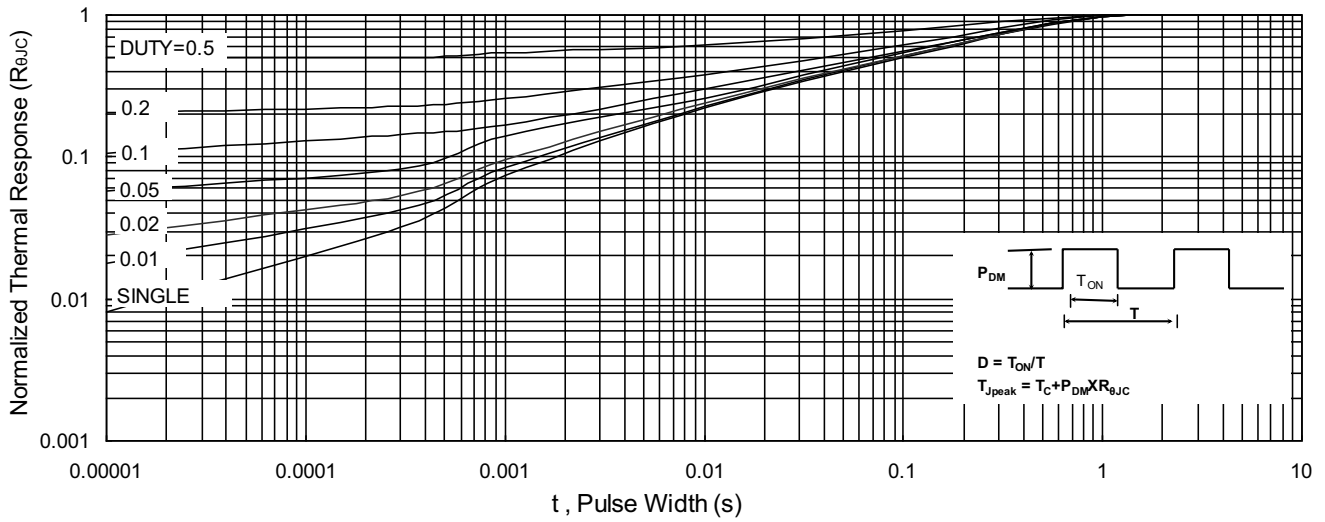
## RATING AND CHARACTERISTICS CURVES (RM70P30DF)



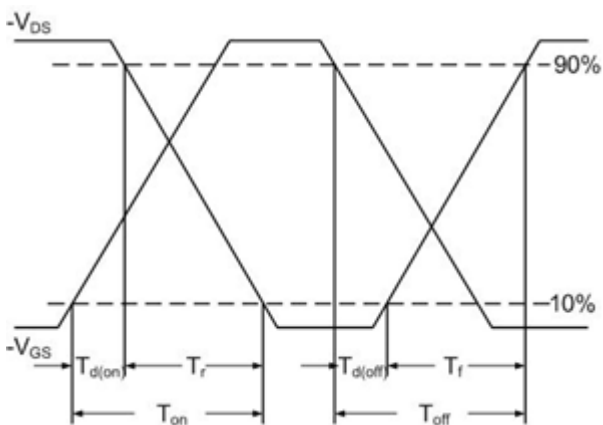
**Fig.7 Capacitance**



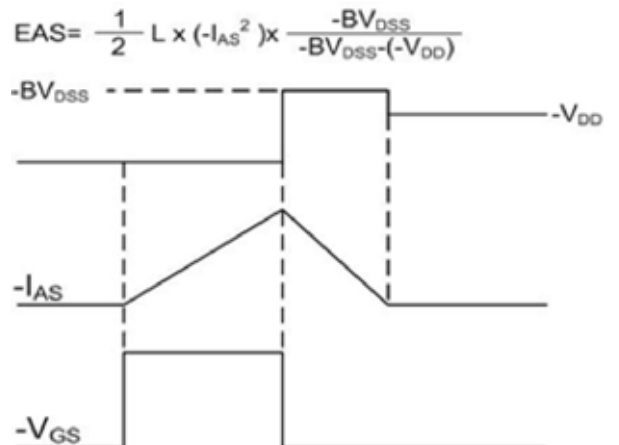
**Fig.8 Safe Operating Area**



**Fig.9 Normalized Maximum Transient Thermal Impedance**

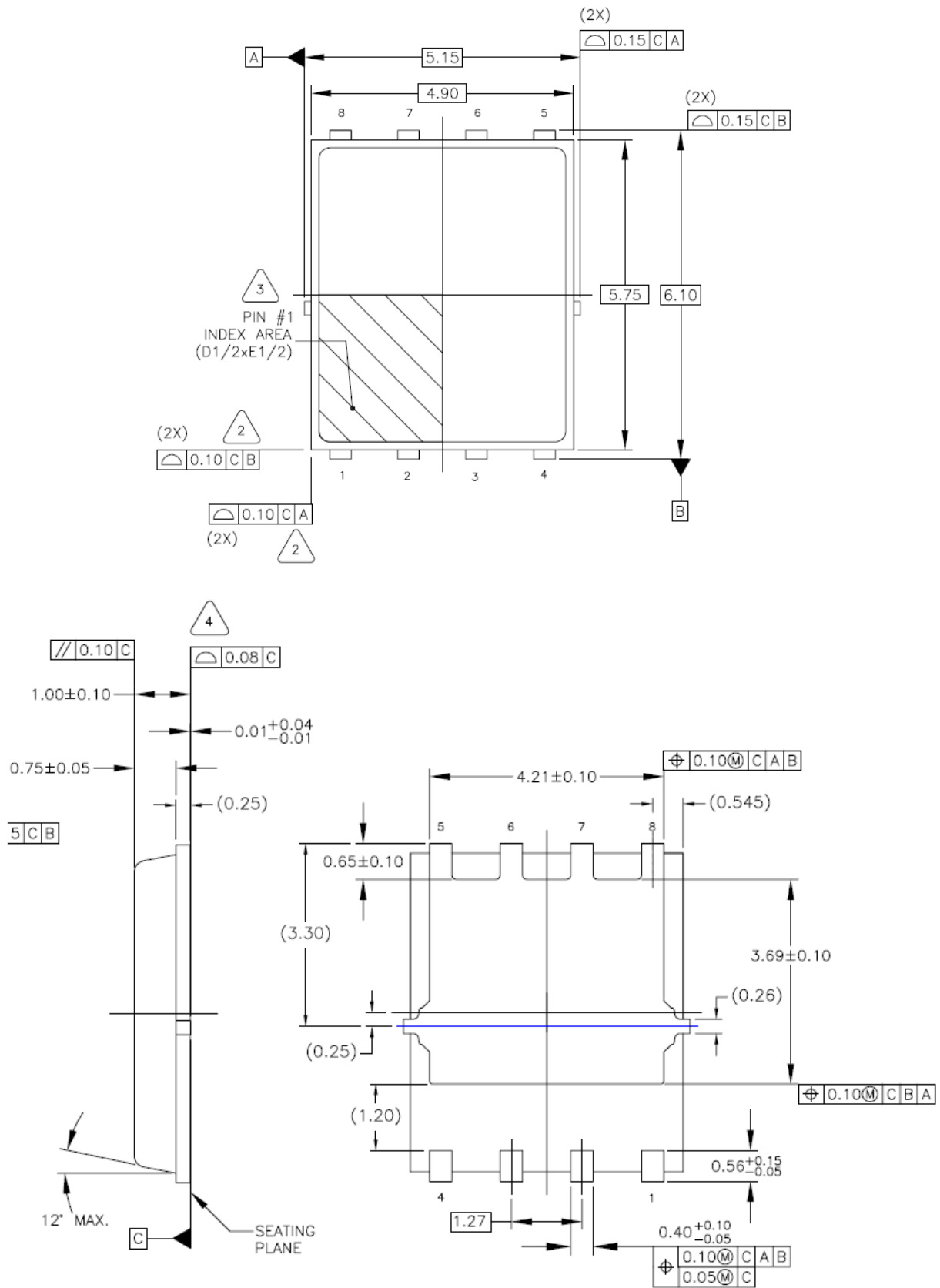


**Fig.10 Switching Time Waveform**



**Fig.11 Unclamped Inductive Switching Waveform**

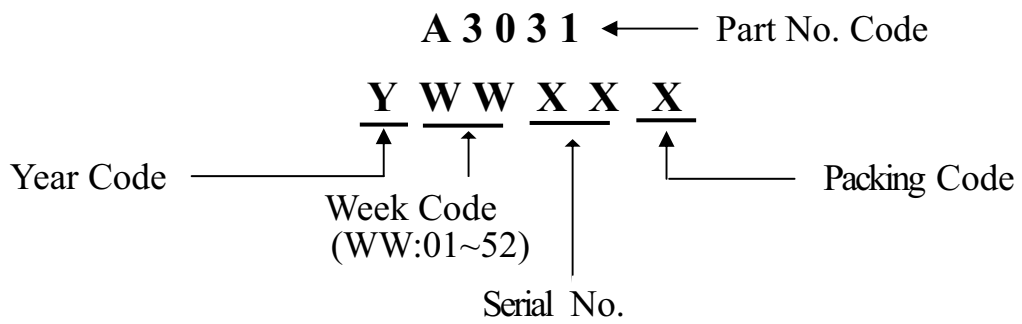
# DFN5X6-8L Package Information





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## Marking on the body



Package	Tube (pcs/tube)	Tube (pcs/inner box)	Tube (pcs/cartoon)	Tape&Reel (pcs/reel)	Tape&Reel (pcs/inner box)	Tape&Reel (pcs/cartoon)
DFN5x6/DFN3x3	100	10,000	100,000	2,500	5,000	40,000
DFN1006	—	—	—	10,000	10,000	400,000
SOP-8	100	10,000	100,000	4,000	4,000	20,000
TSSOP-8	100	32,000	128,000	3,000	6,000	48,000
SOT-23-3L	—	—	—	3,000	30,000	120,000
SOT-23-6L	—	—	—	3,000	30,000	120,000
SOT-23(6R)	—	—	—	3,000	30,000	120,000
SOT-363	—	—	—	3,000	30,000	120,000
SOT-523	—	—	—	3,000	30,000	120,000
SOT223	—	—	—	2,500	2,500	20,000
TO-220	50	1,000	5,000	—	—	—
TO-220F	50	1,000	10,000	—	—	—
TO-247	30	300	1,200	—	—	—
TO-251	80	4,000	40,000	—	—	—
TO-251S(4R)	80	4,000	40,000	—	—	—
TO-252-2L(4R)	80	4,000	40,000	2,500	2,500	25,000
TO-263-2L	50	1,000	10,000	800	800	8,000
TO-3P	30	300	3,000	—	—	—
TO-92	—	—	—	1,000(袋装)	10,000	100,000

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