



# PRM1R8N04N5

PFC Device Corporation

## 40V Single N-Channel MOSFET

### Major ratings and characteristics

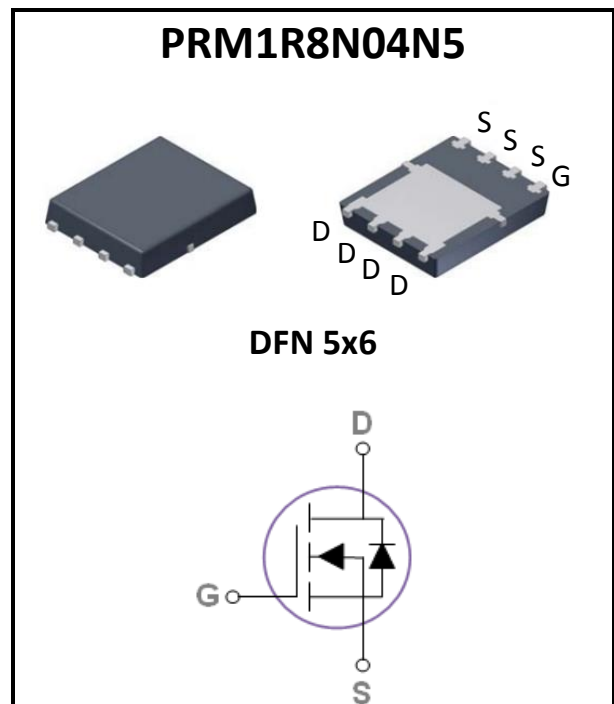
Characteristics	Values	Units
$V_{DS}$	40	V
$I_D^4$ ( $T_C=25^\circ\text{C}$ )	190	A
Max. $R_{DS(ON)}$ @ $V_{GS}=10\text{V}$	1.8	m $\Omega$
Max. $R_{DS(ON)}$ @ $V_{GS}=4.5\text{V}$	2.4	m $\Omega$
$T_J$ Operating Junction Temperature	-55 to +150	$^\circ\text{C}$

### General Description

The N-Channel enhancement mode power field effect transistor is using trench DMOS technology. This advanced technology has been especially tailored to minimize on-state resistance, provide superior switching performance, and withstand high energy pulse in the avalanche and commutation mode. The device is well suited for high efficiency fast switching applications.

### Typical Applications

- Charger Adapter
- Power Tools
- LED Lighting



### Features

- Max.  $R_{DS(ON)}=1.8\text{m}\Omega@V_{GS}=10\text{V}$
- Improved dv/dt capability
- Fast switching
- 100%  $E_{AS}$  Guaranteed
- Green Device Available

## 1. Characteristics

### Maximum Ratings Characteristics ( $T_A = 25^\circ\text{C}$ unless otherwise specified )

Symbol	Parameter	Rating	Units
$V_{DS}$	Drain-Source Voltage	40	V
$V_{GS}$	Gate-Source Voltage	$\pm 20$	V
$I_D^4$	Drain Current – Continuous ( $T_C=25^\circ\text{C}$ )	190	A
	Drain Current – Continuous ( $T_C=100^\circ\text{C}$ )	120	A
$I_D^5$	Drain Current – Continuous ( $T_C=25^\circ\text{C}$ )	100	A
$I_{DM}$	Drain Current – Pulsed <sup>1</sup>	400	A
$E_{AS}$	Single Pulse Avalanche Energy <sup>2</sup>	52	mJ
$I_{AS}$	Single Pulse Avalanche Current <sup>2</sup>	32	A
$P_D$	Power Dissipation ( $T_C=25^\circ\text{C}$ )	89	W
	Power Dissipation – Derate above $25^\circ\text{C}$	0.7	W/ $^\circ\text{C}$
$T_{STG}$	Storage Temperature Range	-55 to 150	$^\circ\text{C}$
$T_J$	Operating Junction Temperature Range	-55 to 150	$^\circ\text{C}$

### Thermal Characteristics

Symbol	Parameter	Typ.	Max.	Unit
$R_{\theta JA}$	Thermal Resistance Junction to ambient	---	40	$^\circ\text{C}/\text{W}$
$R_{\theta JC}$	Thermal Resistance Junction to Case	---	1.4	$^\circ\text{C}/\text{W}$



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

### Off Characteristics

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
$BV_{DSS}$	Drain-Source Breakdown Voltage	$V_{GS}=0V, I_D=250\mu A$	40	---	---	V
$I_{DSS}$	Drain-Source Leakage Current	$V_{DS}=32V, V_{GS}=0V, T_J=25^\circ\text{C}$	---	---	1	$\mu A$
$I_{GSS}$	Gate-Source Leakage Current	$V_{GS}=\pm 20V, V_{DS}=0V$	---	---	$\pm 100$	nA

### On Characteristics

$R_{DS(ON)}$	Static Drain-Source On-Resistance	$V_{GS}=10V, I_D=20A$	---	1.4	1.8	$m\Omega$
		$V_{GS}=4.5V, I_D=10A$	---	2.0	2.4	$m\Omega$
$V_{GS(th)}$	Gate Threshold Voltage	$V_{GS}=V_{DS}, I_D=250\mu A$	1.0	1.7	2.5	V
$g_{fs}$	Forward Transconductance	$V_{DS}=5V, I_D=10A$	---	60	---	S

### Dynamic and switching Characteristics

$Q_g$	Total Gate Charge	$V_{DS}=20V, V_{GS}=10V, I_D=20A$	---	60.0	---	nC
$Q_{gs}$	Gate-Source Charge		---	10.3	---	
$Q_{gd}$	Gate-Drain Charge		---	12.3	---	
$T_{d(on)}$	Turn-On Delay Time	$V_{DD}=20V, V_{GS}=10V, R_G=3\Omega, I_D=20A$	---	16	---	ns
$T_r$	Turn-On Rise Time		---	55	---	
$T_{d(off)}$	Turn-Off Delay Time		---	90	---	
$T_f$	Turn-Off Fall Time		---	20	---	
$C_{iss}$	Input Capacitance	$V_{DS}=20V, V_{GS}=0V, f=1\text{MHz}$	---	3276	---	pF
$C_{oss}$	Output Capacitance		---	1031	---	
$C_{rss}$	Reverse Transfer Capacitance		---	75	---	
$R_g$	Gate resistance	$V_{GS}=0V, V_{DS}=0V, f=1\text{MHz}$	---	0.6	---	$\Omega$

### Drain-Source Diode Characteristics

$V_{SD}^3$	Source to Drain Diode Voltage	$V_{GS}=0V, I_S=1A$	---	---	1.2	V
$t_{rr}$	Reverse Recovery Time	$I_S=20A, di/dt=100A/\mu s$	---	33	---	ns
$Q_{rr}$	Reverse Recovery Charge		---	30	---	nC

Note :

1. Repetitive Rating : Pulsed width limited by maximum junction temperature.
2.  $V_{DD}=50V, V_{GS}=10V, L=0.1\text{mH}, R_G=25\Omega, \text{Starting } T_J=25^\circ\text{C}$
3. The data tested by pulsed, pulse width  $\leq 300\mu s$ , duty cycle  $\leq 2\%$ .
4. Silicon limited.
5. Package limited.



2. Characteristics Curves

Ratings and Characteristics Curves

(  $T_A = 25^\circ\text{C}$  unless otherwise specified )

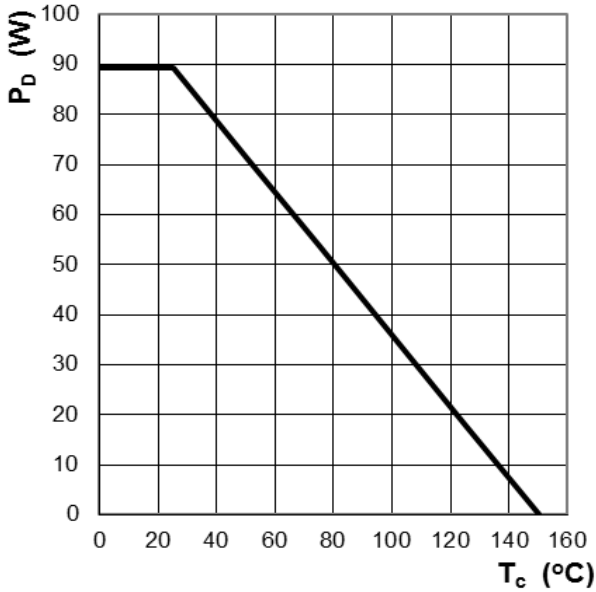


Figure 1: Power Dissipation

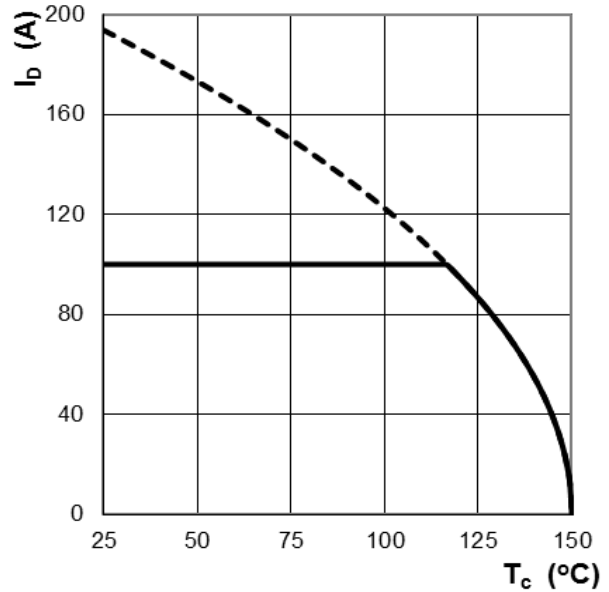


Figure 2: Continuous Drain Current vs.  $T_c$

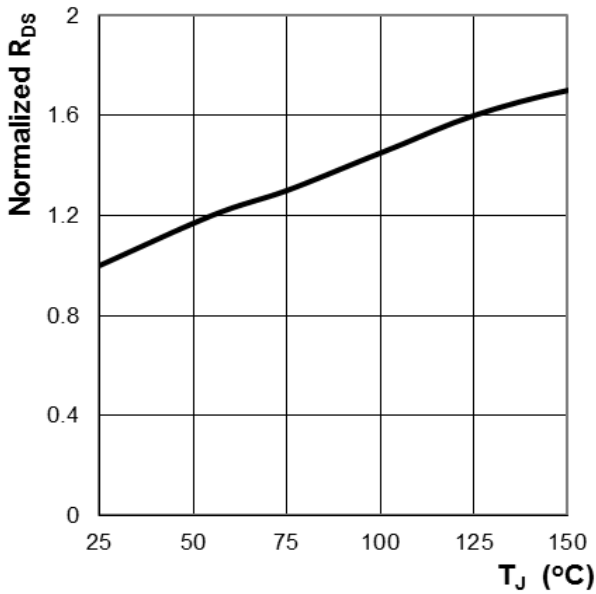


Figure 3: Normalized  $R_{DS(on)}$  vs.  $T_J$

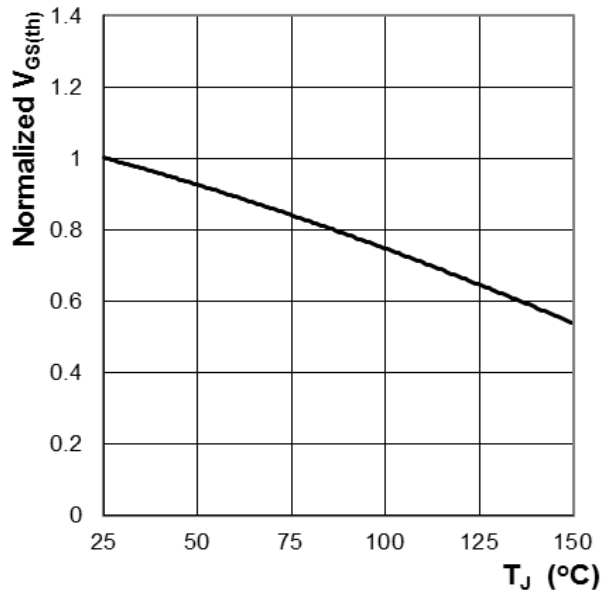


Figure 4: Normalized  $V_{GS(th)}$  vs.  $T_J$



Ratings and Characteristics Curves

(  $T_A = 25^\circ\text{C}$  unless otherwise specified )

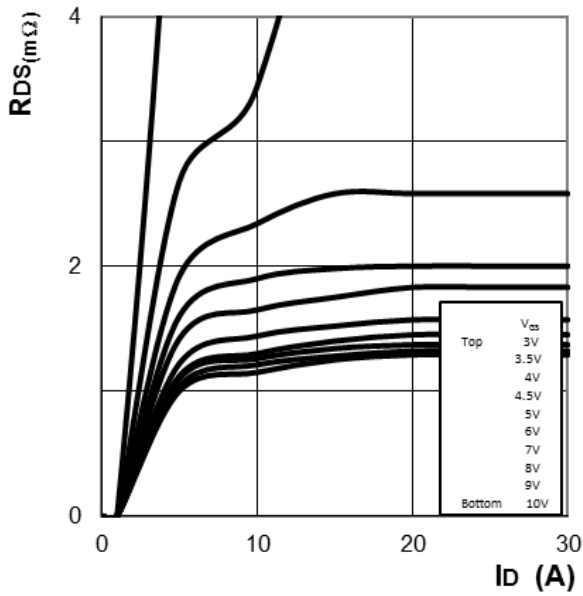


Figure 5: RDS(ON) vs. Drain Current and Gate Voltage

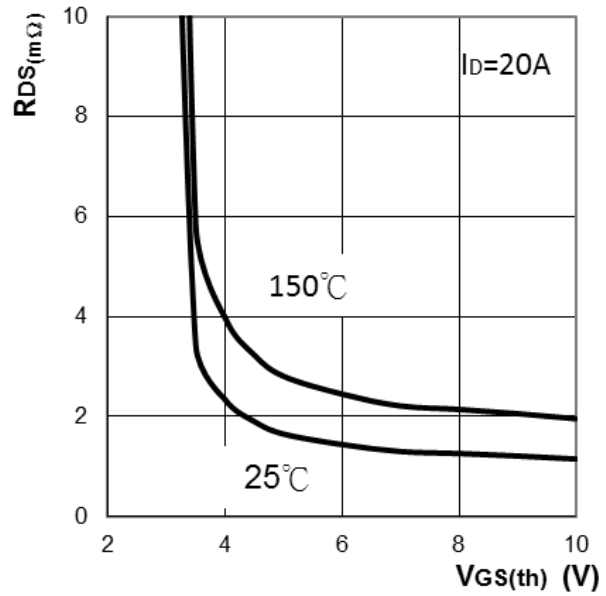


Figure 6: RDS(ON) vs. Gate Voltage

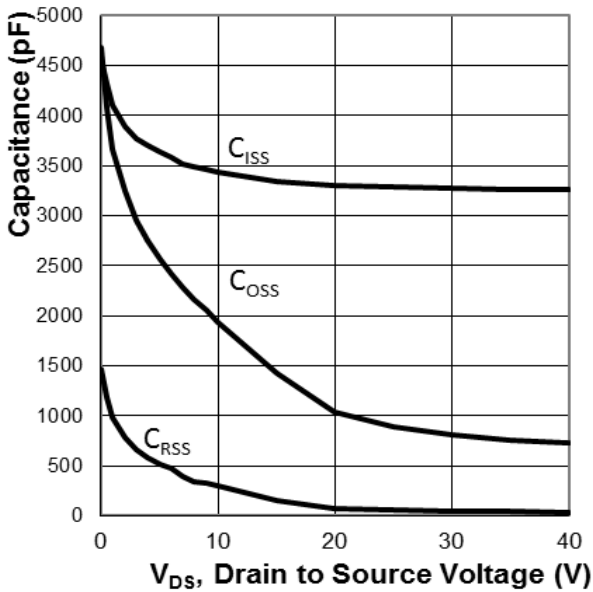


Figure 7: Typ. Capacitance Characteristics

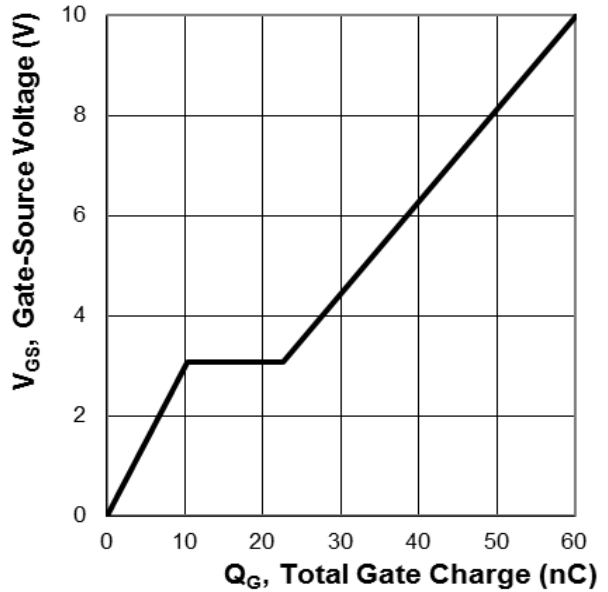


Figure 8: Typ. Gate Charge Characteristics



Ratings and Characteristics Curves

(  $T_A = 25^\circ\text{C}$  unless otherwise specified )

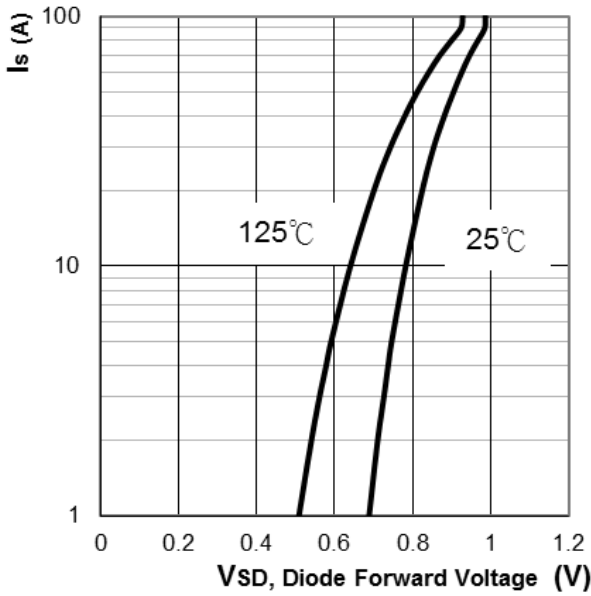


Figure 9: Body Diode Characters

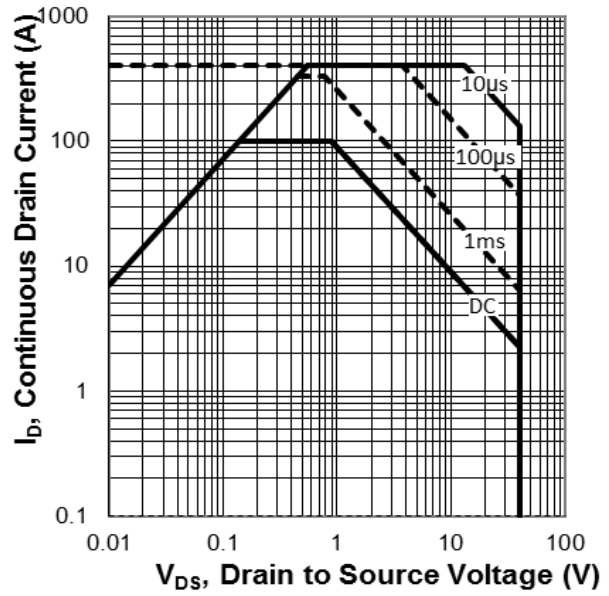


Figure 10: Maximum Safe Operation Area

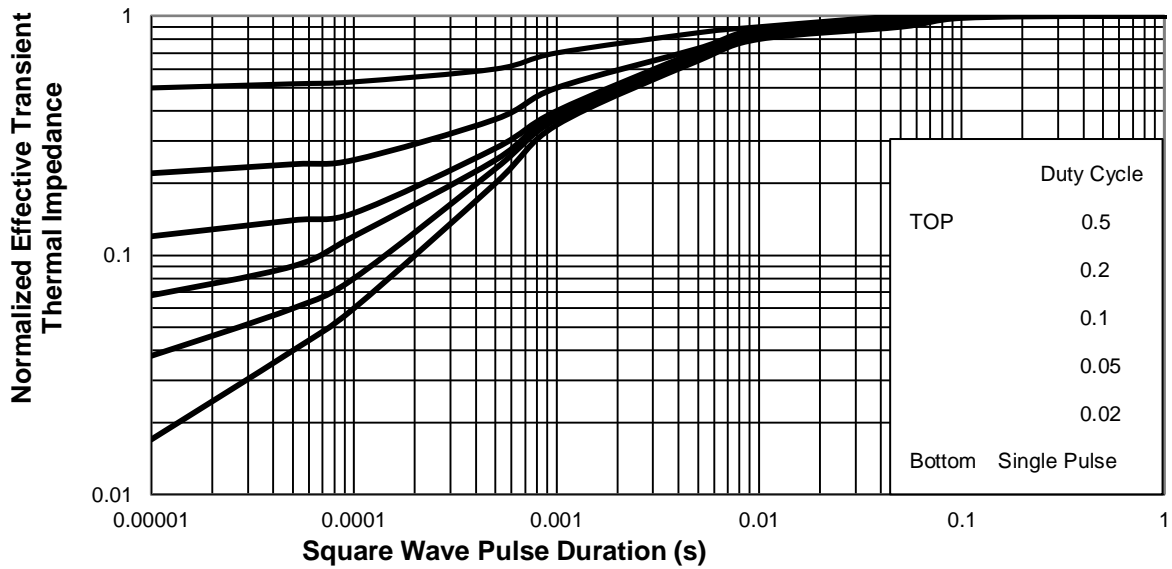
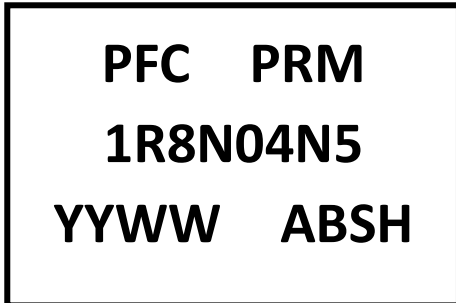


Figure 11: Normalized Thermal Transient Impedance, Junction-to-Case



### 3. Marking information

#### Top Marking Rule



PRM1R8N05N5 = Product Type Marking Code

YYWW = Date Code

YY = Last two digits of year

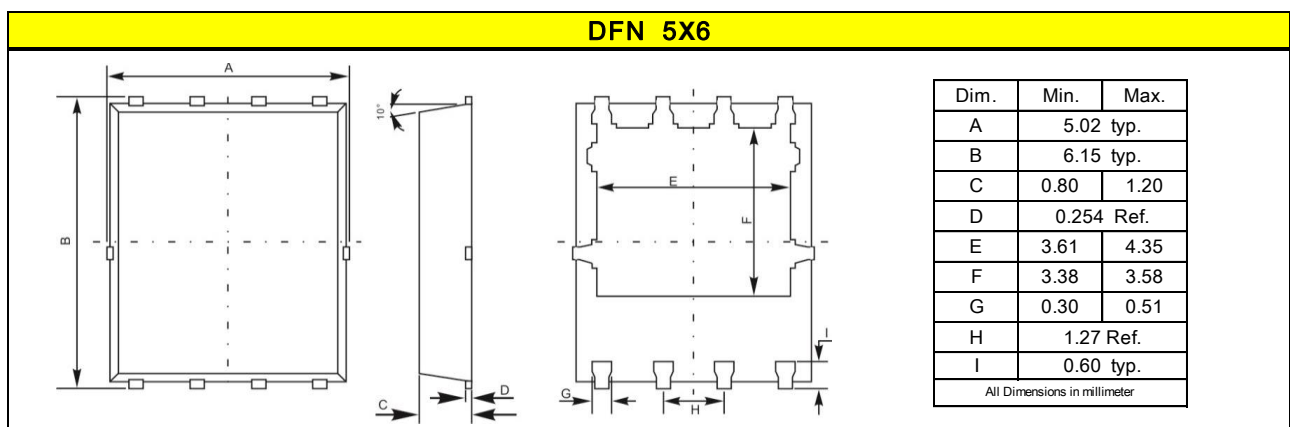
WW = Week code

ABS = Assembly code

H = Halogen Free (N/A = common molding compound)

### 4. Package information

#### Package Outline Dimensions millimeters



**5. Ordering information**

Part Number	Package	Delivery mode
PRM1R8N04N5	DFN 5X6	3000 pcs / 13" diameter reel

Mechanical

- Molder Plastic : UL Flammability Classification Rating 94V-0
- Device Weight : 0.003 ounces (0.093grams) – DFN 5X6

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