

**Features**

- Uni-Directional ESD Protection of Two Line
- Low leakage current
- Low Clamping Voltage
- Moisture Sensitivity Level1
- Halogen Free. "Green" Device (Note 1)
- Epoxy Meets UL 94 V-0 Flammability Rating
- Lead Free Finish/RoHS Compliant ("P" Suffix Designates RoHS Compliant. See Ordering Information)

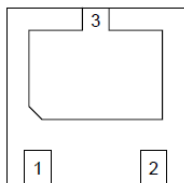
**Maximum Ratings**

IEC61000-4-2 (ESD)	Air	±30KV
	Contact	±30KV
Peak Pulse Power (8/20µs) <sup>(Note2)</sup>	P <sub>PK</sub>	5000W
Operating Junction Temperature Range	T <sub>J</sub>	-55°C to +125°C
Storage Temperature Range	T <sub>STG</sub>	-55°C to +150°C

Note :

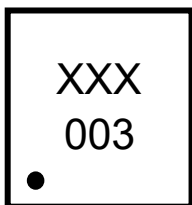
1. Halogen free "Green" products are defined as those which contain <900ppm bromine, <900ppm chlorine (<1500ppm total Br + Cl) and <1000ppm antimony compounds.
2. Non-repetitive current pulse 8/20 µs exponential decay waveform according to IEC61000-4-5.

**Internal Structure**



Transparent top view

**Marking Code**

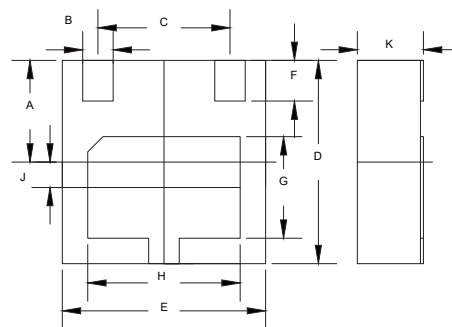


XXX:Device code

MCC Part No.	Device Code
ESDHC12VP4	T12
ESDHC15VP4	T15
ESDHC18VP4	T18
ESDHC24VP4	T24

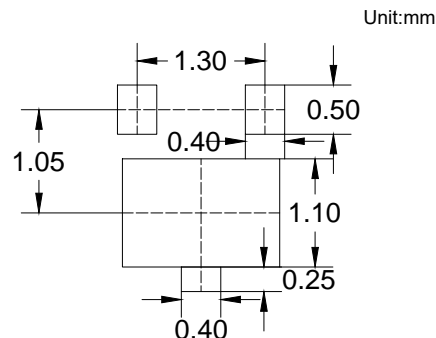
**ESD Protection Device**

**DFN2020-3L**

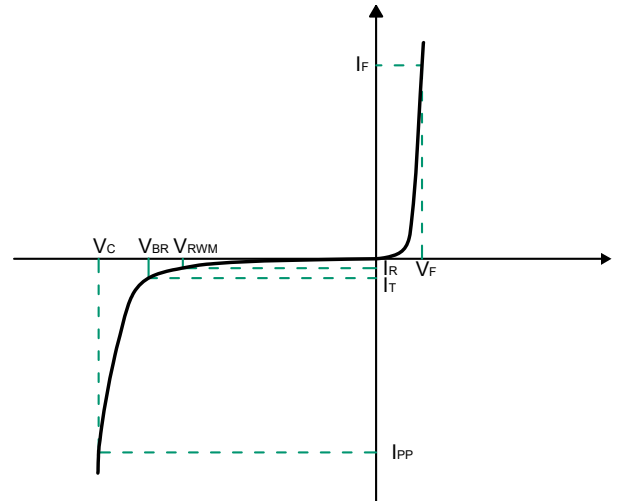


DIM	INCHES		MM		NOTE
	MIN	MAX	MIN	MAX	
A	0.037	0.041	0.950	1.050	
B	0.010	0.014	0.250	0.350	
C	0.051		1.30		TYP.
D	0.075	0.083	1.900	2.100	
E	0.075	0.083	1.900	2.100	
F	0.014	0.018	0.350	0.450	
G	0.035	0.043	0.900	1.100	
H	0.055	0.063	1.400	1.600	
J	0.008	0.012	0.200	0.300	
K	-	0.026	-	0.650	

**SUGGESTED SOLDER PAD LAYOUT**



Symbol	Parameter
$V_{RWM}$	Peak Reverse Working Voltage
$I_R$	Reverse Leakage Current @ $V_{RWM}$
$V_{BR}$	Breakdown Voltage @ $I_T$
$I_T$	Test Current
$I_{PP}$	Maximum Reverse Peak Pulse Current
$V_C$	Clamping Voltage @ $I_{PP}$
$P_{PK}$	Peak Pulse Power
$C_J$	Junction Capacitance
$I_F$	Forward Current
$V_F$	Forward Voltage @ $I_F$



**Electrical Characteristics @ 25°C (Unless Otherwise Specified)**

**ESDHC12VP4**

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Units
Reverse Working Voltage	$V_{RWM}$				12	V
Reverse Breakdown Voltage	$V_{BR}$	$I_T=1mA$	12.8		15	V
Reverse Leakage Current	$I_R$	$V_{RWM}=12V$			0.5	$\mu A$
Clamping Voltage <sup>Note1</sup>	$V_C$	$I_{PP}=50A, t_p=8/20\mu s$		16	20	V
Clamping Voltage <sup>Note1</sup>	$V_C$	$I_{PP}=100A, t_p=8/20\mu s$		18	22	V
Clamping Voltage <sup>Note1</sup>	$V_C$	$I_{PP}=200A, t_p=8/20\mu s$		20	24	V
Junction Capacitance	$C_J$	$V_R=0V, f=1MHz$		1080		pF
Dynamic Resistance <sup>Note2</sup>	$R_{DYN}$	TLP, $t_p=100ns$		0.09		$\Omega$

**ESDHC15VP4**

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Units
Reverse Working Voltage	$V_{RWM}$				15	V
Reverse Breakdown Voltage	$V_{BR}$	$I_T=1mA$	16		19	V
Reverse Leakage Current	$I_R$	$V_{RWM}=15V$			0.5	$\mu A$
Clamping Voltage <sup>Note1</sup>	$V_C$	$I_{PP}=50A, t_p=8/20\mu s$		20	24	V
Clamping Voltage <sup>Note1</sup>	$V_C$	$I_{PP}=100A, t_p=8/20\mu s$		24	27	V
Clamping Voltage <sup>Note1</sup>	$V_C$	$I_{PP}=170A, t_p=8/20\mu s$		30	35	V
Junction Capacitance	$C_J$	$V_R=0V, f=1MHz$		1050		pF
Dynamic Resistance <sup>Note2</sup>	$R_{DYN}$	TLP, $t_p=100ns$		0.035		$\Omega$

**ESDHC18VP4**

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Units
Reverse Working Voltage	$V_{RWM}$				18	V
Reverse Breakdown Voltage	$V_{BR}$	$I_T=1mA$	19		22	V
Reverse Leakage Current	$I_R$	$V_{RWM}=18V$			0.5	$\mu A$
Clamping Voltage <sup>Note1</sup>	$V_C$	$I_{PP}=50A, t_p=8/20\mu s$		23	27	V
Clamping Voltage <sup>Note1</sup>	$V_C$	$I_{PP}=100A, t_p=8/20\mu s$		28	33	V
Clamping Voltage <sup>Note1</sup>	$V_C$	$I_{PP}=150A, t_p=8/20\mu s$		32	38	V
Junction Capacitance	$C_J$	$V_R=0V, f=1MHz$		950		pF
Dynamic Resistance <sup>Note2</sup>	$R_{DYN}$	TLP, $t_p=100ns$		0.05		$\Omega$

**ESDHC24VP4**

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Units
Reverse Working Voltage	$V_{RWM}$				24	V
Reverse Breakdown Voltage	$V_{BR}$	$I_T=1mA$	25		30	V
Reverse Leakage Current	$I_R$	$V_{RWM}=24V$			0.5	$\mu A$
Clamping Voltage <sup>Note1</sup>	$V_C$	$I_{PP}=50A, t_p=8/20\mu s$		34	38	V
Clamping Voltage <sup>Note1</sup>	$V_C$	$I_{PP}=100A, t_p=8/20\mu s$		40	44	V
Clamping Voltage <sup>Note1</sup>	$V_C$	$I_{PP}=120A, t_p=8/20\mu s$		46	60	V
Junction Capacitance	$C_J$	$V_R=0V, f=1MHz$		800		pF
Dynamic Resistance <sup>Note2</sup>	$R_{DYN}$	TLP, $t_p=100ns$		0.05		$\Omega$

Note :

 1. Non-repetitive current pulse 8/20 $\mu s$  exponential decay waveform according to IEC61000-4-5.

 2. TLP parameter:  $Z_0=50\Omega, t_p=100ns, t_r=2ns$ , averaging window from 60ns to 80ns.  $R_{DYN}$  is calculated from 4A to 16A.

**Curve Characteristics**

Fig. 1 - 8 X 20µs Pulse Waveform

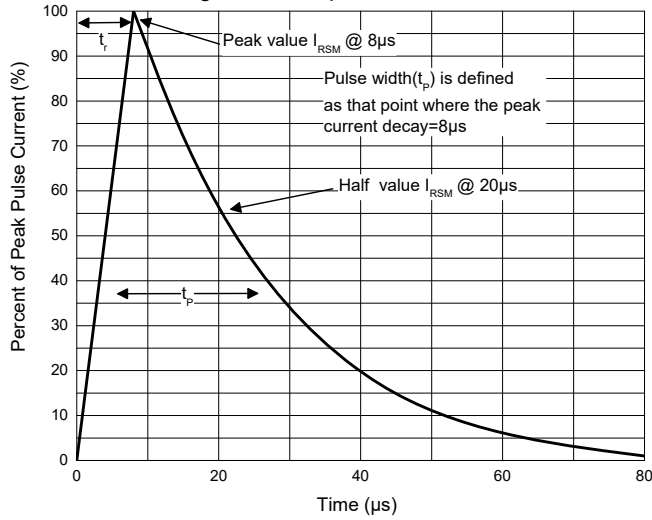


Fig. 2 - Non-Repetitive Peak Pulse Power

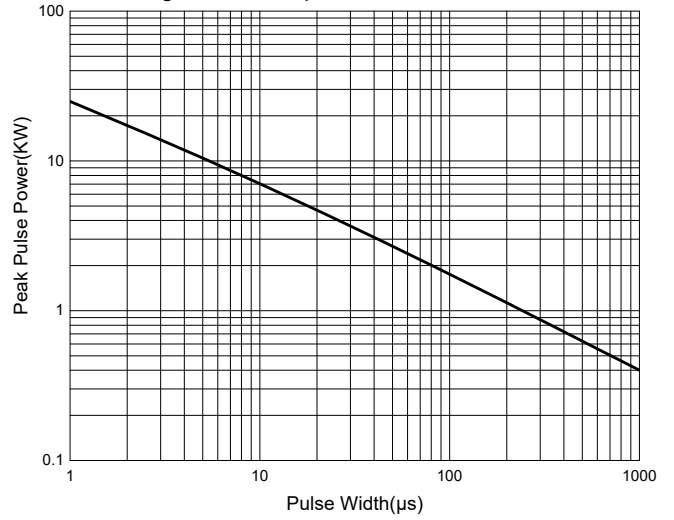


Fig. 3 - Capacitance Characteristics

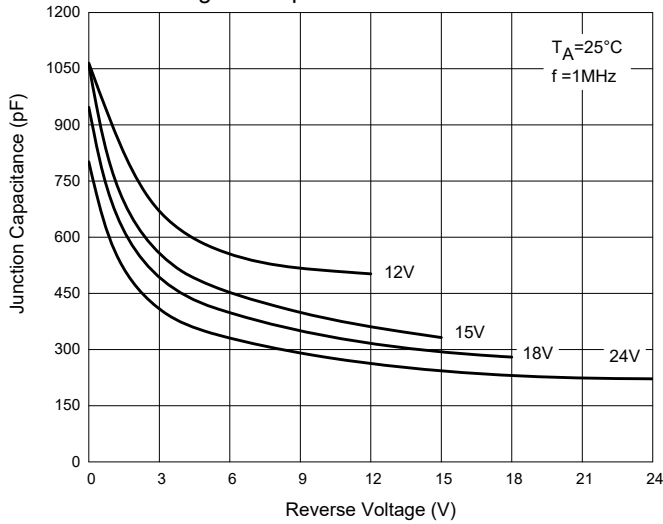


Fig. 4 - Clamping Voltage Characteristics

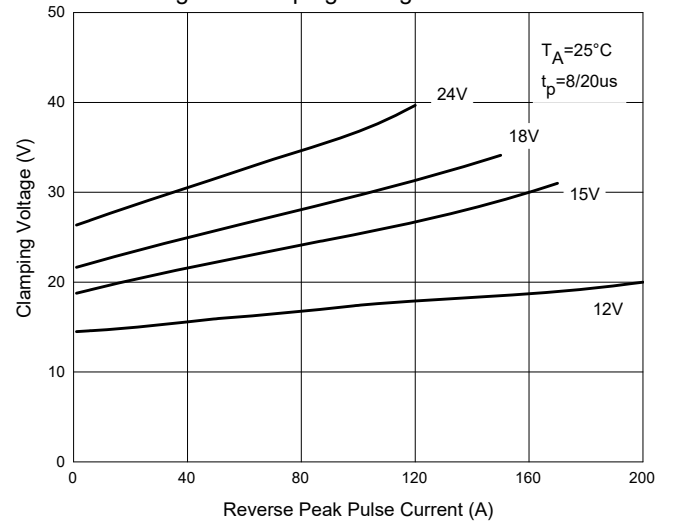


Fig. 5 - TLP Curve

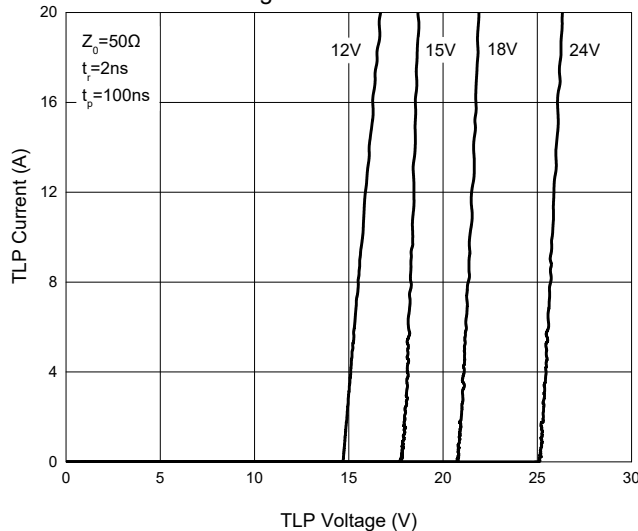
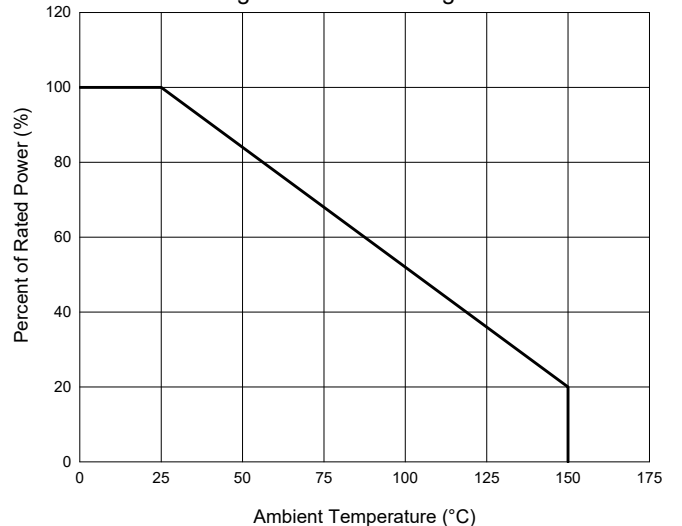


Fig. 6 - Pulse Derating Curve



## Ordering Information

Device	Packing
Part Number-TP	Tape&Reel: 3Kpcs/Reel

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