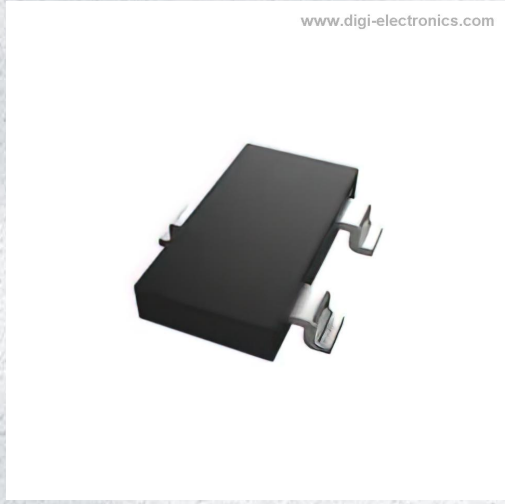
# 2N7002HV-TP Datasheet




https://www.DiGi-Electronics.com

| | |
|---|---|
| DiGi Electronics Part Number | 2N7002HV-TP-DG |
| Manufacturer | Micro Commercial Co |
| Manufacturer Product Number | 2N7002HV-TP |
| Description | N-CHANNEL MOSFET SOT-23 |
| Detailed Description | N-Channel 60 V 115mA 200mW Surface Mount SOT-23 |

Tel: +00 852-30501935

RFQ Email: Info@DiGi-Electronics.com

## Purchase and inquiry

| Manufacturer Product Number: | Manufacturer: |
| --- | --- |
| 2N7002HV-TP | Micro Commercial Co |
| Series: | Product Status: |
| - | Not For New Designs |
| FET Type: | Technology: |
| N-Channel | MOSFET (Metal Oxide) |
| Drain to Source Voltage (Vdss): | Current - Continuous Drain (Id) @ 25°C: |
| 60 V | 115mA |
| Drive Voltage (Max Rds On, Min Rds On): | Rds On (Max) @ Id, Vgs: |
| 5V, 10V | 7.5Ohm @ 500mA, 10V |
| Vgs(th) (Max) @ Id: | Vgs (Max): |
| 1.8V @ 250µA | ±20V |
| Input Capacitance (Ciss) (Max) @ Vds: | FET Feature: |
| 50 pF @ 25 V | - |
| Power Dissipation (Max): | Operating Temperature: |
| 200mW | -55°C ~ 150°C (TJ) |
| Mounting Type: | Supplier Device Package: |
| Surface Mount | SOT-23 |
| Package / Case: | Base Product Number: |
| TO-236-3, SC-59, SOT-23-3 | 2N7002 |

## Environmental & Export classification

| RoHS Status: | Moisture Sensitivity Level (MSL): |
| --- | --- |
| ROHS3 Compliant | 1 (Unlimited) |
| REACH Status: | ECCN: |
| REACH Unaffected | EAR99 |
| HTSUS: | |
| 8541.21.0095 | |

Micro Commercial Components

**2N7002HV**

## Features

- Trench MV MOSFET Technology
- Low Threshold Voltage
- Moisture Sensitivity Level 1
- 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)

# N-Channel MOSFET

## Maximum Ratings

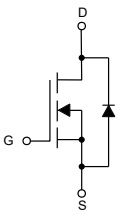
- Operating Junction Temperature Range: -55°C to +150°C
- Storage Temperature: -55°C to +150°C
- Thermal Resistance: 320°C/W Junction to Ambient(Note2)

| Parameter | | Symbol | Rating | Unit |
|---|---|---|---|---|
| Drain-Source Voltage | | $V_{DS}$ | 60 | V |
| Gate-Source Volltage | | $V_{GS}$ | ±20 | V |
| Continuous Drain Current | $T_A$=25°C | $I_D$ | 115 | mA |
| | $T_A$=100°C | | 73 | |
| Pulsed Drain Current(Note3) | | $I_{DM}$ | 460 | mA |
| Total Power Dissipation(Note4) | | $P_D$ | 390 | mW |

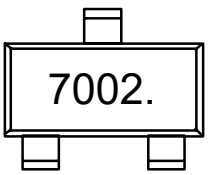
Note:

1. Halogen free "Green" products are defined as those which contain <900ppm bromine, <900ppm chlorine (<1500ppm total Br + Cl) and <1000ppm antimony compounds.
2. The value of $R_{\theta JA}$ is measured with the device mounted on the minimum recommended pad size, in a still air environment with $T_A$ =25°C.
3. Repetitive rating; pulse width limited by max. junction temperature.
4. $P_D$ is based on max. junction temperature, using junction to ambient thermal resistance.

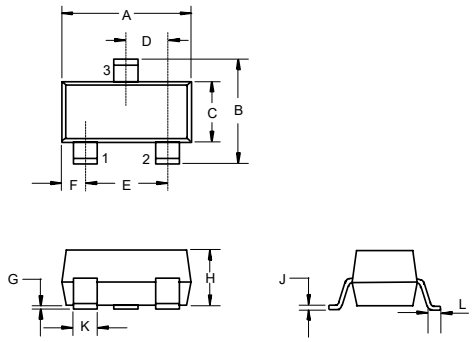
## Internal Structure and Marking Code




1. GATE
2. SOURCE
3. DRAIN

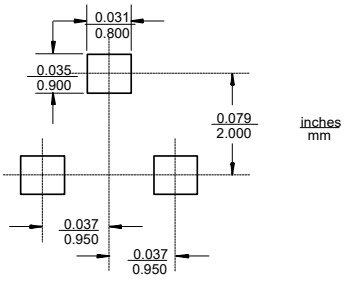



## SOT-23




| DIMENSIONS | | | | | |
|---|---|---|---|---|---|
| DIM | INCHES | | MM | | NOTE |
| | MIN | MAX | MIN | MAX | |
| A | 0.110 | 0.120 | 2.80 | 3.04 | |
| B | 0.083 | 0.104 | 2.10 | 2.64 | |
| C | 0.047 | 0.055 | 1.20 | 1.40 | |
| D | 0.034 | 0.041 | 0.85 | 1.05 | |
| E | 0.067 | 0.083 | 1.70 | 2.10 | |
| F | 0.018 | 0.024 | 0.45 | 0.60 | |
| G | 0.0004 | 0.006 | 0.01 | 0.15 | |
| H | 0.035 | 0.043 | 0.90 | 1.10 | |
| J | 0.003 | 0.007 | 0.08 | 0.18 | |
| K | 0.012 | 0.020 | 0.30 | 0.51 | |
| L | 0.007 | 0.020 | 0.20 | 0.50 | |

**Suggested Solder Pad Layout**



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

| Parameter | Symbol | Test Conditions | Min | Typ | Max | Unit |
|---|---|---|---|---|---|---|
| **Static Characteristics** | | | | | | |
| Drain-Source Breakdown Voltage | $V_{(BR)DSS}$ | $V_{GS}$=0V, $I_D$=10μA | 60 | | | V |
| Gate-Source Leakage Current | $I_{GSS}$ | $V_{DS}$=0V, $V_{GS}$=±20V | | | ±100 | nA |
| Zero Gate Voltage Drain Current | $I_{DSS}$ | $V_{DS}$=60V, $V_{GS}$=0V | | | 80 | nA |
| | | $V_{DS}$=60V, $V_{GS}$=0V, $T_J$=125°C | | | 1 | μA |
| Gate-Threshold Voltage | $V_{GS(th)}$ | $V_{DS}$=$V_{GS}$, $I_D$=250μA | 1.6 | 1.7 | 1.8 | V |
| Drain-Source On-Resistance | $R_{DS(on)}$ | $V_{GS}$=10V, $I_D$=500mA | | 0.9 | 3 | Ω |
| | | $V_{GS}$=5V, $I_D$=50mA | | 1 | 4 | |
| Forward Transconductance | $g_{fs}$ | $V_{DS}$ =10V, $I_D$ =200mA | | 300 | | mS |
| Gate Resistance | $R_g$ | F=1 MHz, Open drain | | 6 | | Ω |
| **Diode Characteristics** | | | | | | |
| Continuous Body Diode Current | $I_S$ | | | | 115 | mA |
| Diode Forward Voltage | $V_{SD}$ | $V_{GS}$=0V, $I_S$=115mA | | | 1.5 | V |
| Reverse Recovery Time | $t_{rr}$ | $I_F$=0.34A, $dI_F/dt$=100A/μs | | 7 | | ns |
| Reverse Recovery Charge | $Q_{rr}$ | | | 8 | | nC |
| **Dynamic Characteristics** | | | | | | |
| Input Capacitance | $C_{iss}$ | $V_{DS}$=25V,$V_{GS}$=0V,f=1MHz | | 34 | | pF |
| Output Capacitance | $C_{oss}$ | | | 5 | | |
| Reverse Transfer Capacitance | $C_{rss}$ | | | 4 | | |
| Total Gate Charge | $Q_g$ | $V_{DS}$=25V,$V_{GS}$=10V,$I_D$=0.35A | | 1.6 | | nC |
| Gate-Source Charge | $Q_{gs}$ | | | 0.47 | | |
| Gate-Drain Charge | $Q_{gd}$ | | | 0.25 | | |
| Turn-On Delay Time | $t_{d(on)}$ | $V_{DD}$=30V, $V_{GS}$=10V, $R_{GEN}$=25Ω, $I_{DS}$=340mA | | 0.8 | | ns |
| Turn-On Rise Time | $t_r$ | | | 15 | | |
| Turn-Off Delay Time | $t_{d(off)}$ | | | 4 | | |
| Turn-Off Fall Time | $t_f$ | | | 33 | | |

## Curve Characteristics

**Fig.1 - Typical Output Characteristics**

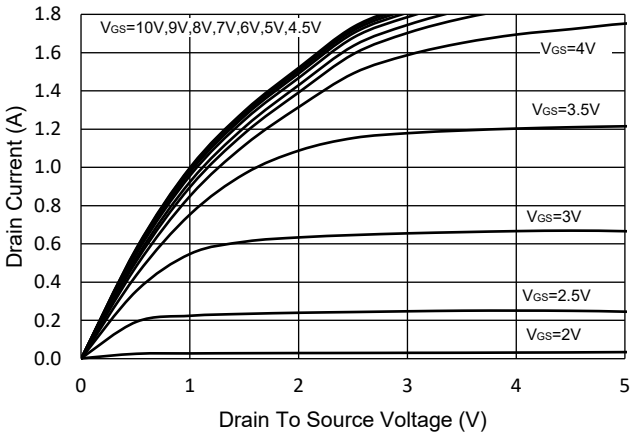



**Fig.2 - Transfer Characteristic**

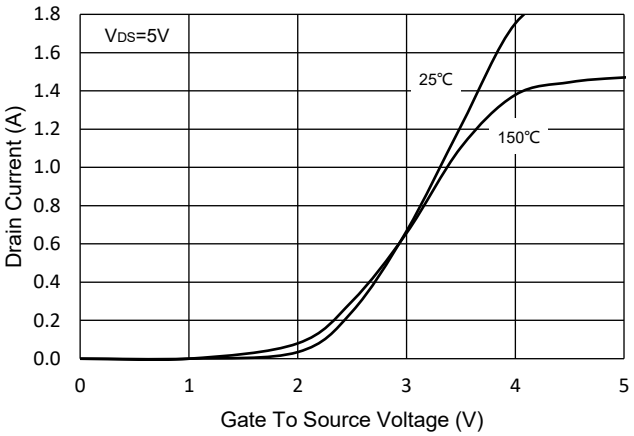



**Fig.3 - $R_{DS(ON)}$ - $V_{GS}$**

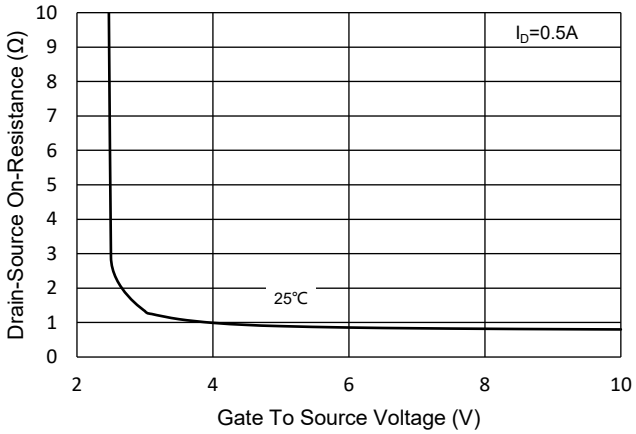



**Fig.4 - $R_{DS(ON)}$ - $I_D$**

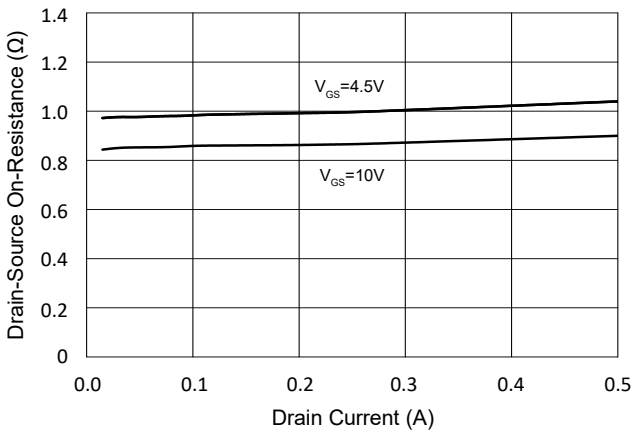



**Fig.5 - Capacitance Characteristics**

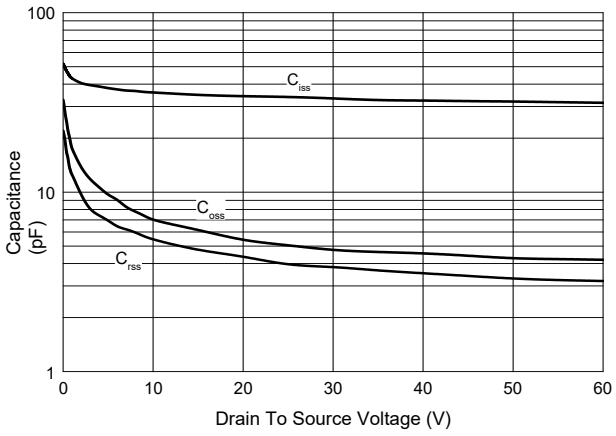
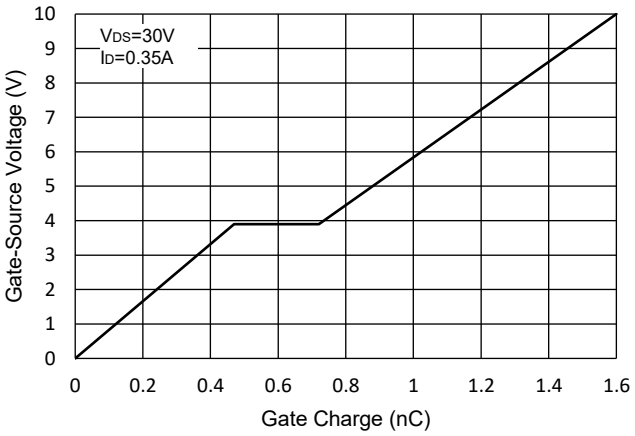



**Fig.6 - Gate Charge**



## Curve Characteristics

**Fig.7 - Normalized Threshold Voltage**

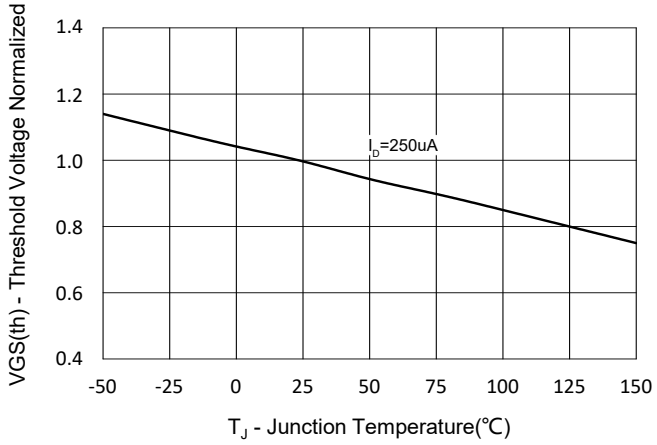



**Fig.8 - Normalized On Resistance Characteristics**

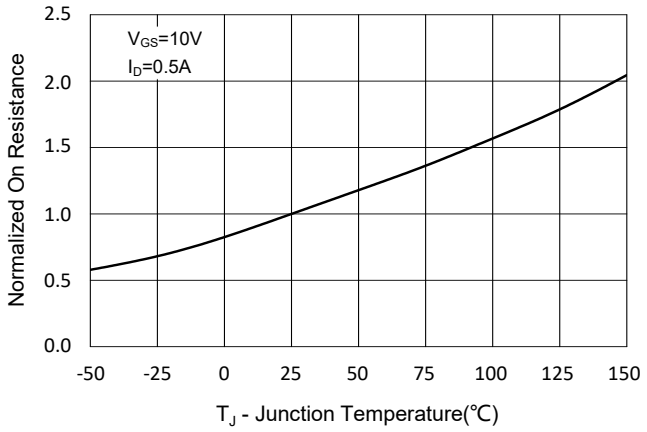



**Fig.9 - $I_S$ - $V_{SD}$**

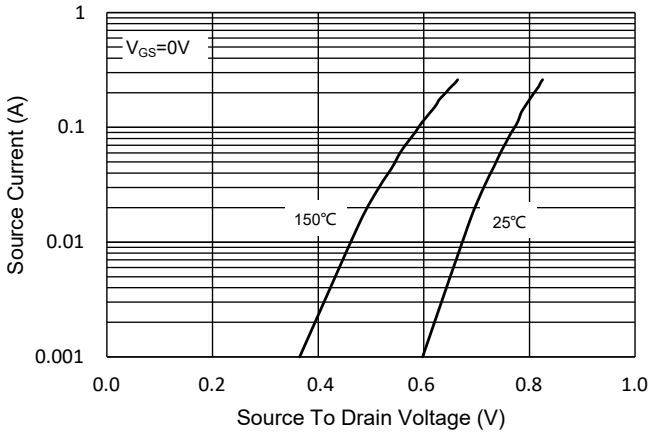



**Fig.10 - Drain Current**

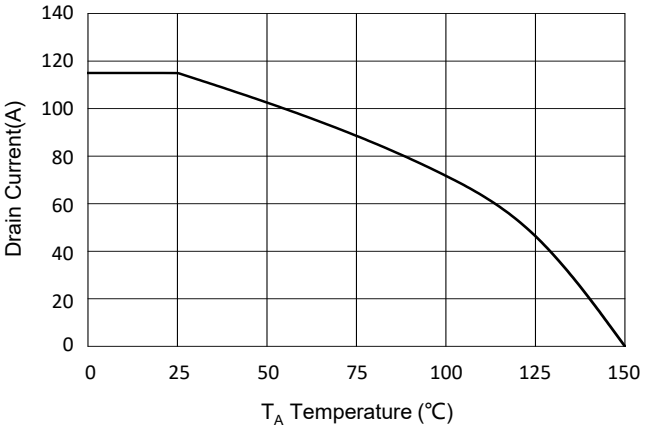
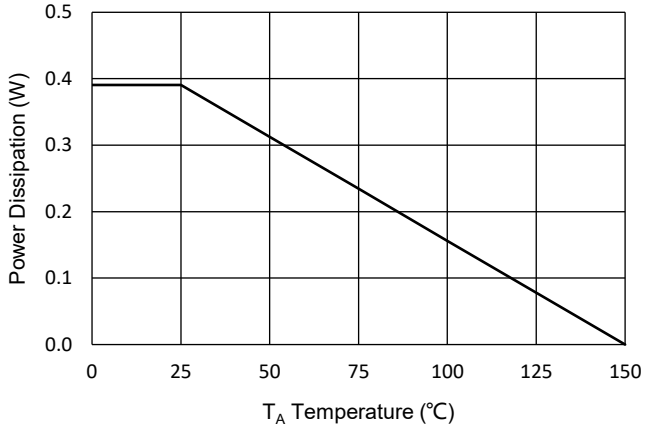



**Fig.11 - PD Dissipation**



## Curve Characteristics

**Fig.12 - Safe Operation Area**

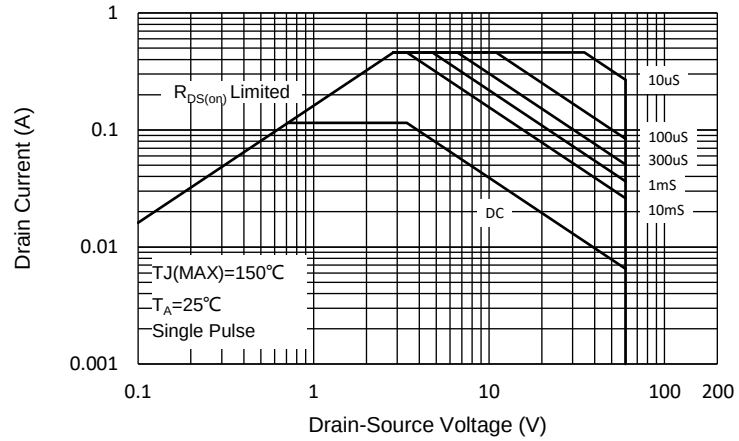
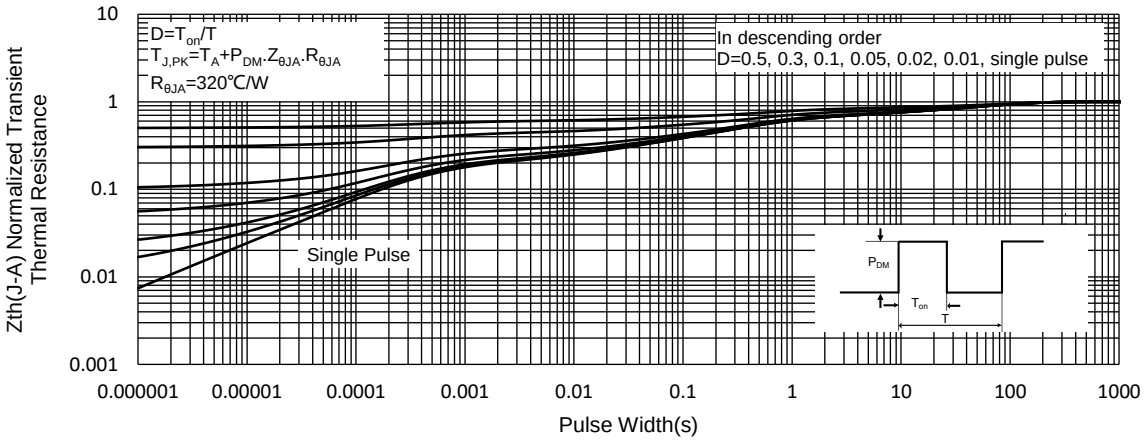



**Fig.13 - Normalized Transient Thermal Impedance**



## Ordering Information

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

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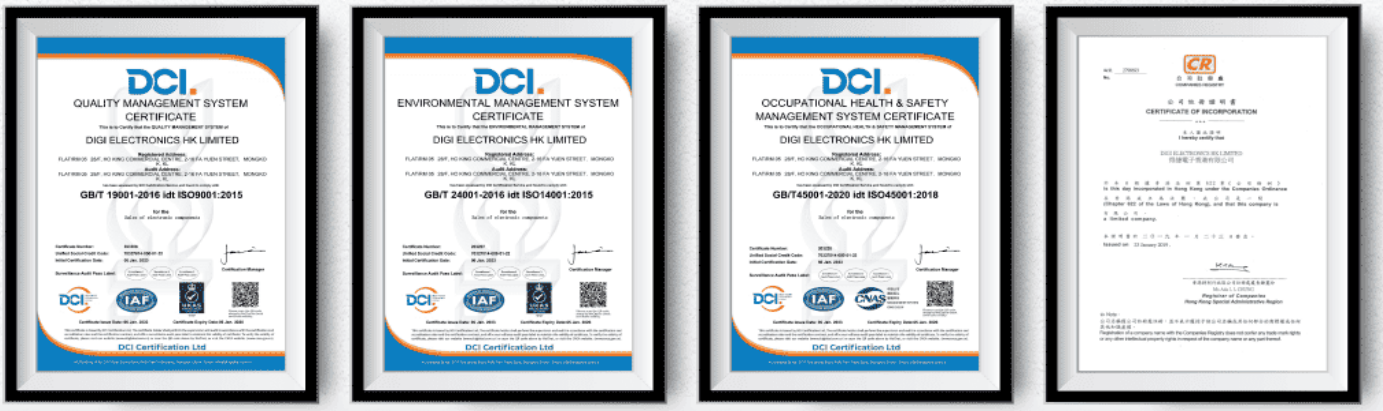



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