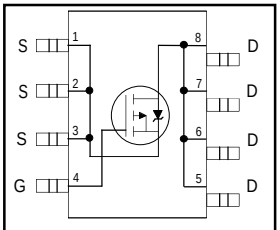
International
IOR Rectifier

PD- 91850B

# IRF7220

HEXFET® Power MOSFET

- Ultra Low On-Resistance
- P-Channel MOSFET
- Surface Mount
- Available in Tape & Reel



Top View

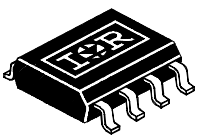
$V_{DSS}$ = -14V

$R_{DS(on)}$ = 0.012W

## Description

These P-Channel MOSFETs from International Rectifier utilize advanced processing techniques to achieve the extremely low on-resistance per silicon area. This benefit provides the designer with an extremely efficient device for use in battery and load management applications..

The SO-8 has been modified through a customized leadframe for enhanced thermal characteristics and multiple-die capability making it ideal in a variety of power applications. With these improvements, multiple devices can be used in an application with dramatically reduced board space. The package is designed for vapor phase, infra red, or wave soldering techniques.


SO-8

## Absolute Maximum Ratings

| | Parameter | Max. | Units |
|---|---|---|---|
| $V_{DS}$ | Drain- Source Voltage | -14 | V |
| $I_D$ @ $T_A$ = 25°C | Continuous Drain Current, $V_{GS}$ @ -4.5V | ±11 | A |
| $I_D$ @ $T_A$= 70°C | Continuous Drain Current, $V_{GS}$ @ -4.5V | ±8.8 | |
| $I_{DM}$ | Pulsed Drain Current ① | ±88 | |
| $P_D$ @$T_A$ = 25°C | Power Dissipation | 2.5 | W |
| $P_D$ @$T_A$ = 70°C | Power Dissipation | 1.6 | |
| | Linear Derating Factor | 0.02 | W/°C |
| $E_{AS}$ | Single Pulse Avalanche Energy④ | 110 | mJ |
| $V_{GS}$ | Gate-to-Source Voltage | ± 12 | V |
| $T_{J,}$ $T_{STG}$ | Junction and Storage Temperature Range | -55 to + 150 | °C |

## Thermal Resistance

| | Parameter | Max. | Units |
|---|---|---|---|
| $R_{qJA}$ | Maximum Junction-to-Ambient③ | 50 | °C/W |

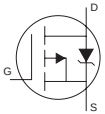


03/15/99

## Electrical Characteristics @ $T_J$ = 25°C (unless otherwise specified)

| | Parameter | Min. | Typ. | Max. | Units | Conditions |
|---|---|---|---|---|---|---|
| $V_{(BR)DSS}$ | Drain-to-Source Breakdown Voltage | -14 | — | — | V | $V_{GS}$ = 0V, $I_D$ = -5mA |
| $DV_{(BR)DSS}/DT_J$ | Breakdown Voltage Temp. Coefficient | — | -0.006 | — | V/°C | Reference to 25°C, $I_D$ = -1mA |
| $R_{DS(on)}$ | Static Drain-to-Source On-Resistance | — | .0082 | 0.012 | Ω | $V_{GS}$ = -4.5V, $I_D$ = -11A ② |
| | | — | .0125 | 0.020 | | $V_{GS}$ = -2.5V, $I_D$ = -8.8A ② |
| $V_{GS(th)}$ | Gate Threshold Voltage | -0.60 | — | — | V | $V_{DS}$ = $V_{GS}$, $I_D$ = -250µA |
| $g_{fs}$ | Forward Transconductance | 8.4 | — | — | S | $V_{DS}$ = -10V, $I_D$ = -11A |
| $I_{DSS}$ | Drain-to-Source Leakage Current | — | — | -5.0 | µA | $V_{DS}$ = -11.2V, $V_{GS}$ = 0V |
| | | — | — | -100 | | $V_{DS}$ = -11.2V, $V_{GS}$ = 0V, $T_J$ = 70°C |
| $I_{GSS}$ | Gate-to-Source Forward Leakage | — | — | -100 | nA | $V_{GS}$ = -12V |
| | Gate-to-Source Reverse Leakage | — | — | 100 | | $V_{GS}$ = 12V |
| $Q_g$ | Total Gate Charge | — | 84 | 125 | nC | $I_D$ = -11A |
| $Q_{gs}$ | Gate-to-Source Charge | — | 13 | 20 | | $V_{DS}$ = -10V |
| $Q_{gd}$ | Gate-to-Drain ("Miller") Charge | — | 37 | 55 | | $V_{GS}$ = -5.0V ② |
| $t_{d(on)}$ | Turn-On Delay Time | — | 19 | — | ns | $V_{DD}$ = -10V |
| $t_r$ | Rise Time | — | 420 | — | | $I_D$ = -11A |
| $t_{d(off)}$ | Turn-Off Delay Time | — | 140 | — | | $R_G$ = 0.90Ω |
| $t_f$ | Fall Time | — | 1040 | — | | $R_D$ = 6.2Ω ② |
| $C_{iss}$ | Input Capacitance | — | 8075 | — | pF | $V_{GS}$ = 0V |
| $C_{oss}$ | Output Capacitance | — | 4400 | — | | $V_{DS}$ = -10V |
| $C_{rss}$ | Reverse Transfer Capacitance | — | 4150 | — | | $f$ = 1.0MHz |

## Source-Drain Ratings and Characteristics

| | Parameter | Min. | Typ. | Max. | Units | Conditions |
|---|---|---|---|---|---|---|
| $I_S$ | Continuous Source Current (Body Diode) | — | — | -2.5 | A | MOSFET symbol showing the integral reverse p-n junction diode.  |
| $I_{SM}$ | Pulsed Source Current (Body Diode) ① | — | — | -88 | | |
| $V_{SD}$ | Diode Forward Voltage | — | — | -1.2 | V | $T_J$ = 25°C, $I_S$ = -2.5A, $V_{GS}$ = 0V ② |
| $t_{rr}$ | Reverse Recovery Time | — | 160 | 240 | ns | $T_J$ = 25°C, $I_F$ = -2.5A |
| $Q_{rr}$ | Reverse RecoveryCharge | — | 147 | 220 | nC | di/dt = 100A/µs ② |

**Notes:**

① Repetitive rating; pulse width limited by max. junction temperature.

② Pulse width £ 300µs; duty cycle £ 2%.

③ When mounted on 1 inch square copper board, t<10 sec

④ Starting $T_J$ = 25°C, L = 1.8mH
$R_G$ = 25Ω, $I_{AS}$ = 11A. (See Figure 10)

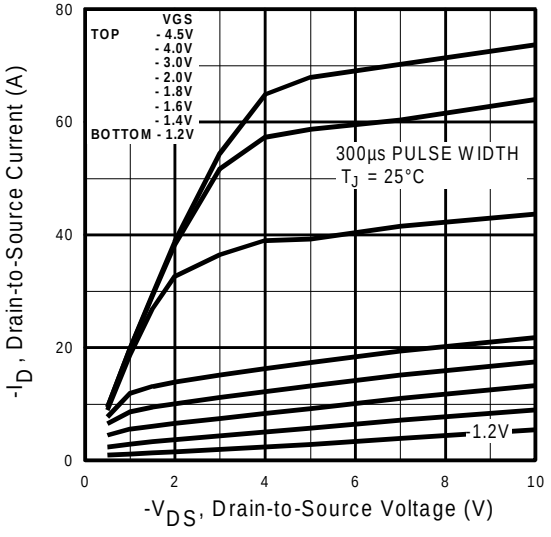



**Fig 1.** Typical Output Characteristics

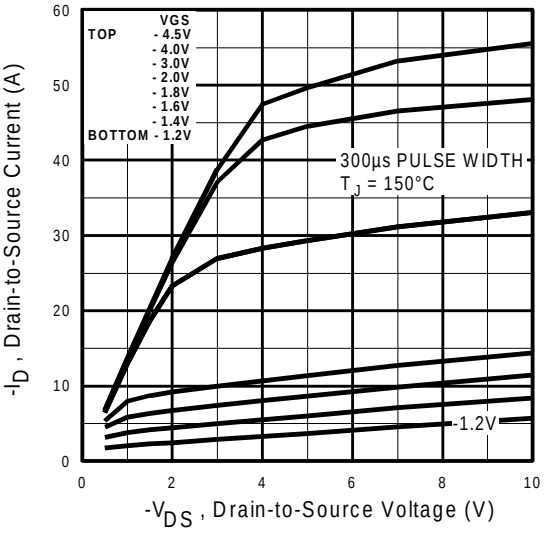



**Fig 2.** Typical Output Characteristics

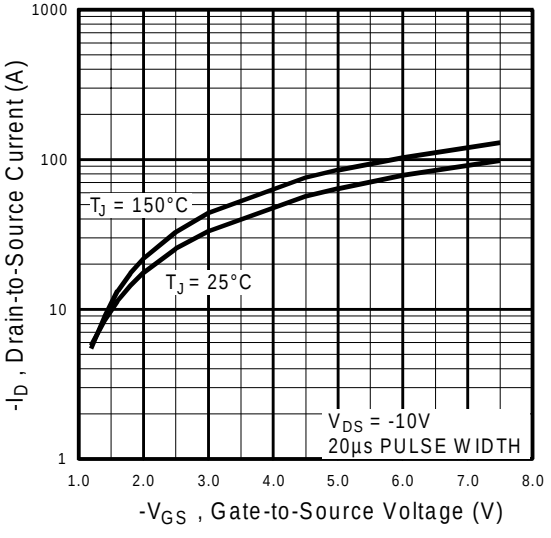



**Fig 3.** Typical Transfer Characteristics

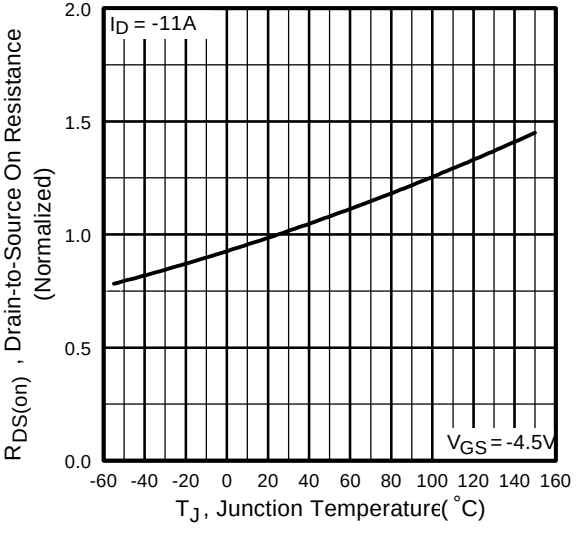



**Fig 4.** Normalized On-Resistance Vs. Temperature

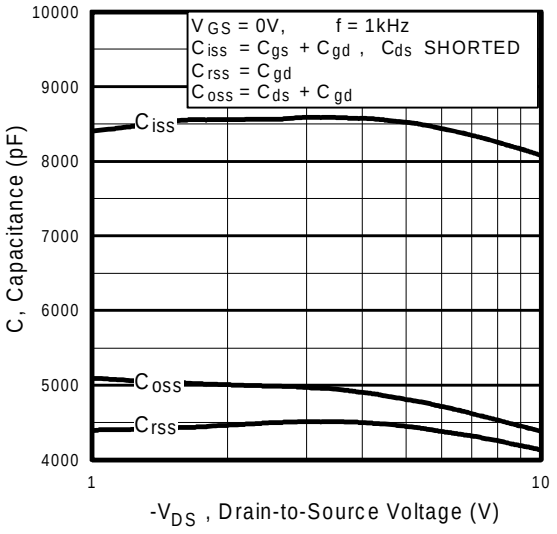



**Fig 5.** Typical Capacitance Vs. Drain-to-Source Voltage

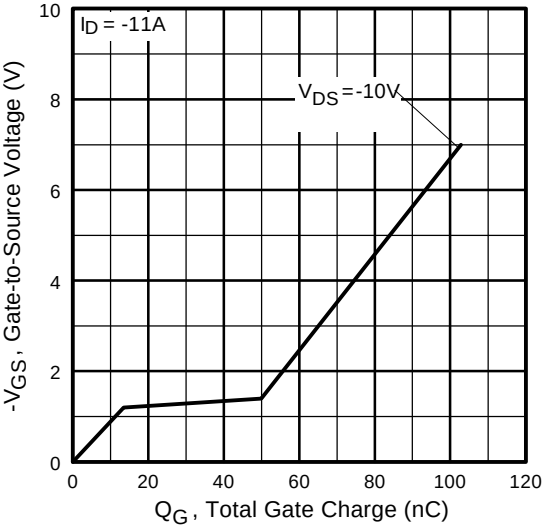



**Fig 6.** Typical Gate Charge Vs. Gate-to-Source Voltage

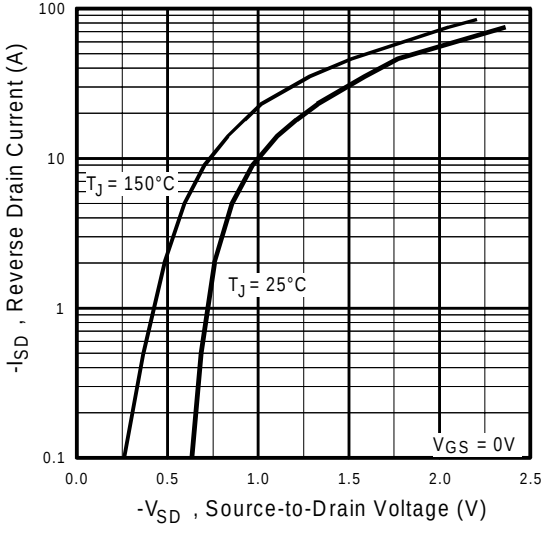



**Fig 7.** Typical Source-Drain Diode Forward Voltage

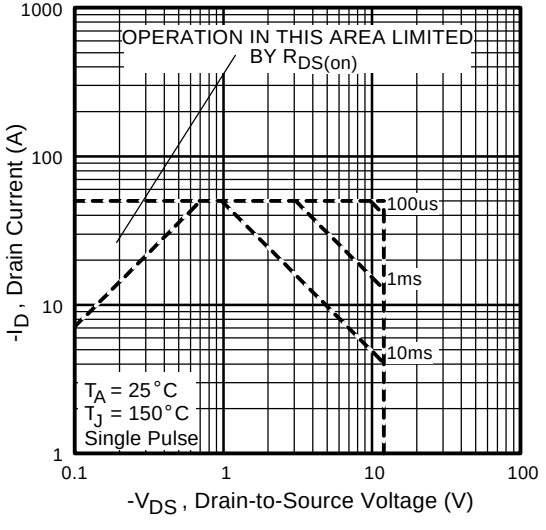



**Fig 8.** Maximum Safe Operating Area

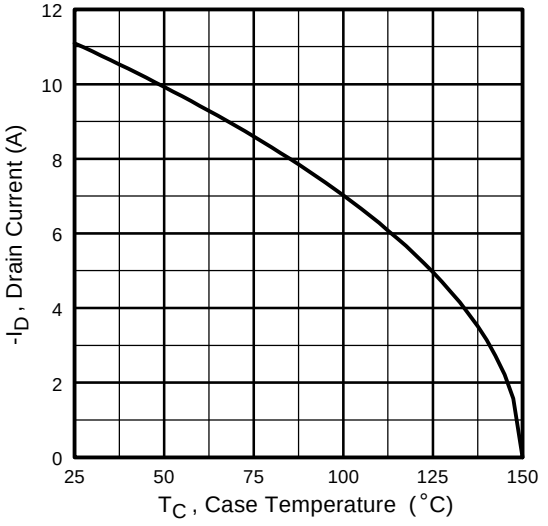



**Fig 9.** Maximum Drain Current Vs. Case Temperature

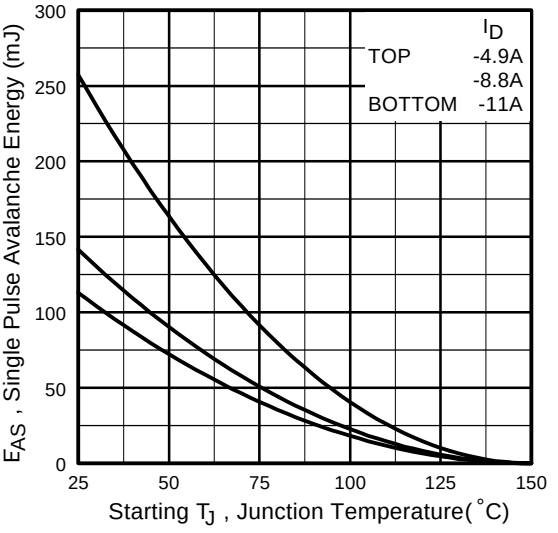



**Fig 10.** Maximum Avalanche Energy Vs. Drain Current

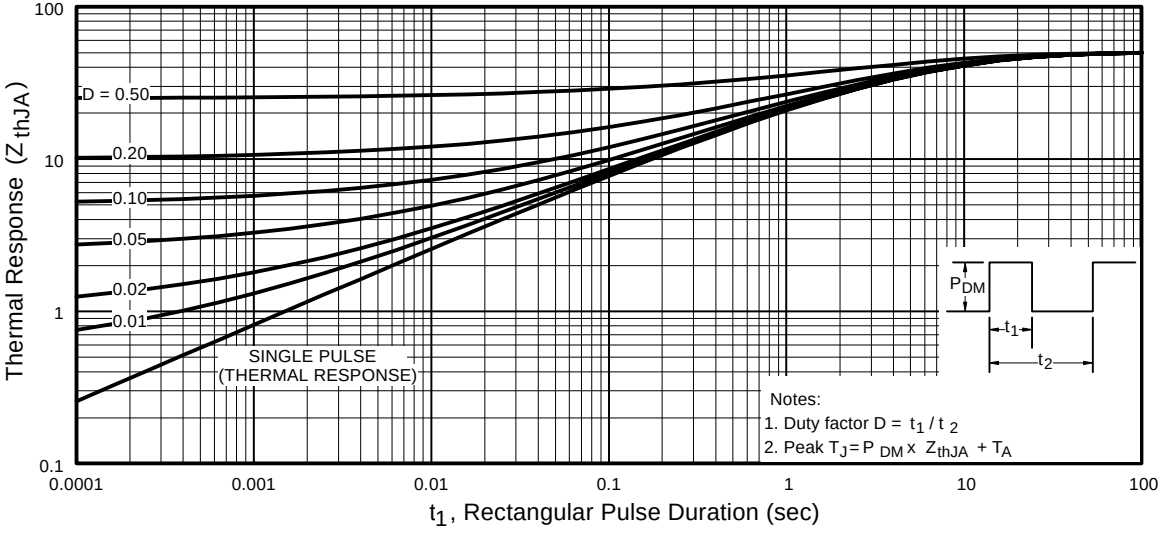
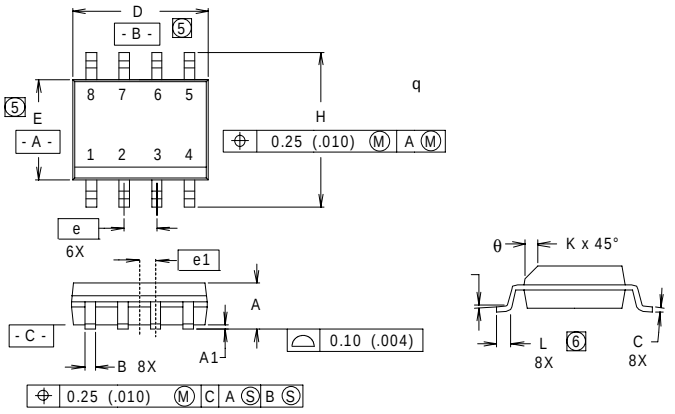



**Fig 11.** Maximum Effective Transient Thermal Impedance, Junction-to-Ambient

## SO-8 Package Details




| DIM | INCHES | | MILLIMETERS | |
|---|---|---|---|---|
| | MIN | MAX | MIN | MAX |
| A | .0532 | .0688 | 1.35 | 1.75 |
| A1 | .0040 | .0098 | 0.10 | 0.25 |
| B | .014 | .018 | 0.36 | 0.46 |
| C | .0075 | .0098 | 0.19 | 0.25 |
| D | .189 | .196 | 4.80 | 4.98 |
| E | .150 | .157 | 3.81 | 3.99 |
| e | .050 BASIC | | 1.27 BASIC | |
| e1 | .025 BASIC | | 0.635 BASIC | |
| H | .2284 | .2440 | 5.80 | 6.20 |
| K | .011 | .019 | 0.28 | 0.48 |
| L | 0.16 | .050 | 0.41 | 1.27 |
| θ | 0° | 8° | 0° | 8° |

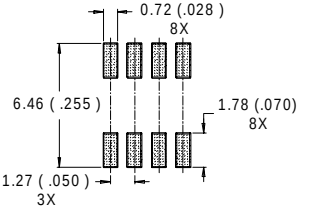
NOTES:

1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M-1982.
2. CONTROLLING DIMENSION : INCH.
3. DIMENSIONS ARE SHOWN IN MILLIMETERS (INCHES).
4. OUTLINE CONFORMS TO JEDEC OUTLINE MS-012AA.

5 DIMENSION DOES NOT INCLUDE MOLD PROTRUSIONS
MOLD PROTRUSIONS NOT TO EXCEED 0.25 (.006).

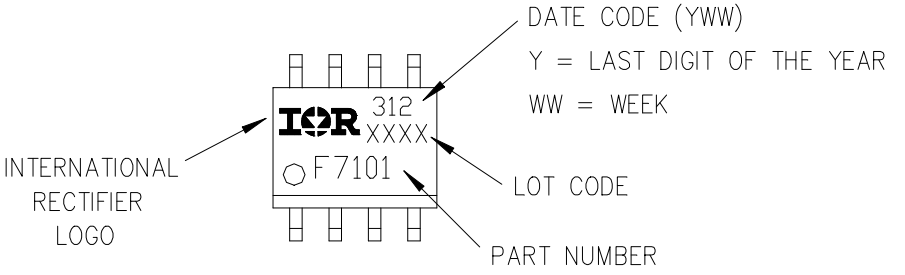
6 DIMENSIONS IS THE LENGTH OF LEAD FOR SOLDERING TO A SUBSTRATE..

RECOMMENDED FOOTPRINT

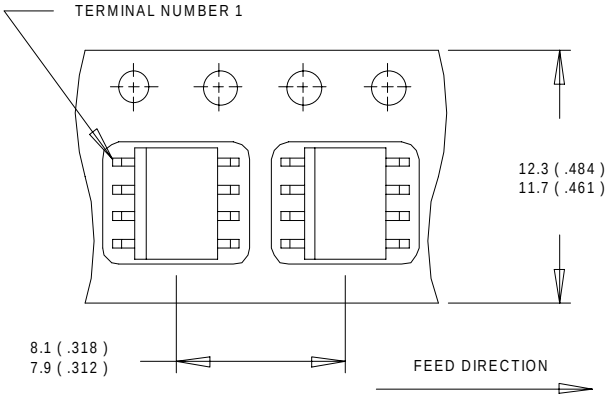



## Part Marking

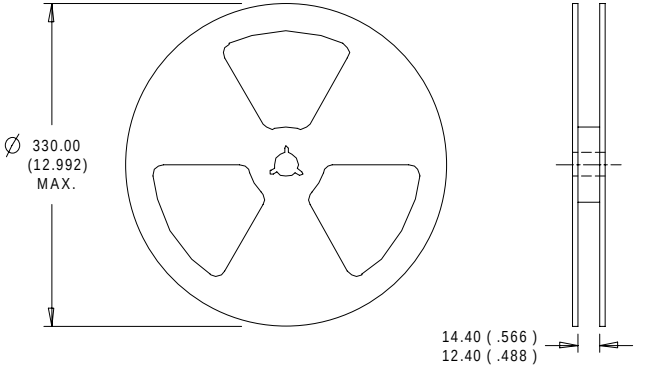
EXAMPLE: THIS IS AN IRF7101



## Tape and Reel




NOTES:
1. CONTROLLING DIMENSION : MILLIMETER.
2. ALL DIMENSIONS ARE SHOWN IN MILLIMETERS(INCHES).
3. OUTLINE CONFORMS TO EIA-481 & EIA-541.




NOTES :
1. CONTROLLING DIMENSION : MILLIMETER.
2. OUTLINE CONFORMS TO EIA-481 & EIA-541.

International
IOR Rectifier

**WORLD HEADQUARTERS:** 233 Kansas St., El Segundo, California 90245, Tel: (310) 322 3331
**IR GREAT BRITAIN:** Hurst Green, Oxted, Surrey RH8 9BB, UK Tel: ++ 44 1883 732020
**IR CANADA:** 15 Lincoln Court, Brampton, Ontario L6T3Z2, Tel: (905) 453 2200
**IR GERMANY:** Saalburgstrasse 157, 61350 Bad Homburg Tel: ++ 49 6172 96590
**IR ITALY:** Via Liguria 49, 10071 Borgaro, Torino Tel: ++ 39 11 451 0111
**IR FAR EAST:** K&H Bldg., 2F, 30-4 Nishi-Ikebukuro 3-Chome, Toshima-Ku, Tokyo Japan 171 Tel: 81 3 3983 0086
**IR SOUTHEAST ASIA:** 1 Kim Seng Promenade, Great World City West Tower, 13-11, Singapore 237994 Tel: ++ 65 838 4630
**IR TAIWAN:**16 Fl. Suite D. 207, Sec. 2, Tun Haw South Road, Taipei, 10673, Taiwan Tel: 886-2-2377-9936
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