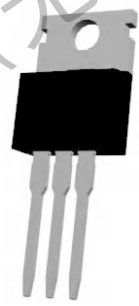
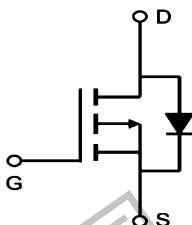


TM60P06P

P-Channel Enhancement Mosfet

General Description • Low $R_{DS(ON)}$ • RoHS and Halogen-Free Compliant Applications • Load switch • PWM	General Features $V_{DS} = -60V$ $I_D = -60A$ $R_{DS(ON)} = 16.5m\Omega (typ.) @ V_{GS} = -10V$ 100% UIS Tested 100% R_g Tested 																																									
 Marking: 60P06  P:TO-220AB G D S 																																										
Absolute Maximum Ratings ($T_C = 25^{\circ}C$ unless otherwise noted) <table><tr><th>Symbol</th><th>Parameter</th><th>Ratings</th><th>Units</th></tr><tr><td>V_{DS}</td><td>Drain-Source Voltage</td><td>-60</td><td>V</td></tr><tr><td>V_{GS}</td><td>Gate-Source Voltage</td><td>± 20</td><td>V</td></tr><tr><td rowspan="2">I_D</td><td>Continuous Drain Current</td><td>-60</td><td rowspan="3">A</td></tr><tr><td>Continuous Drain Current-$T_C = 100^{\circ}C$</td><td>-44</td></tr><tr><td>I_{DM}</td><td>Pulsed Drain Current¹</td><td>-290</td></tr><tr><td>P_D</td><td>Power Dissipation</td><td>300</td><td>W</td></tr><tr><td>E_{AS}</td><td>Single pulse avalanche energy²</td><td>750</td><td>mJ</td></tr><tr><td>T_J, T_{STG}</td><td>Operating and Storage Junction Temperature Range</td><td>-55-+175</td><td>$^{\circ}C$</td></tr></table> Thermal Characteristics <table><tr><th>Symbol</th><th>Parameter</th><th>Max</th><th>Units</th></tr><tr><td>$R_{\theta JC}$</td><td>Thermal Resistance, Junction to Case</td><td>1.67</td><td>$^{\circ}C/W$</td></tr></table>		Symbol	Parameter	Ratings	Units	V_{DS}	Drain-Source Voltage	-60	V	V_{GS}	Gate-Source Voltage	± 20	V	I_D	Continuous Drain Current	-60	A	Continuous Drain Current- $T_C = 100^{\circ}C$	-44	I_{DM}	Pulsed Drain Current ¹	-290	P_D	Power Dissipation	300	W	E_{AS}	Single pulse avalanche energy ²	750	mJ	T_J, T_{STG}	Operating and Storage Junction Temperature Range	-55-+175	$^{\circ}C$	Symbol	Parameter	Max	Units	$R_{\theta JC}$	Thermal Resistance, Junction to Case	1.67	$^{\circ}C/W$
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TM60P06P

P-Channel Enhancement Mosfet

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

Symbol	Parameter	Conditions	Min	Typ	Max	Units
Off Characteristics						
BV _{DSS}	Drain-Source Breakdown Voltage	V _{GS} =0V, I _D =-250 μ A	-60	---	---	V
I _{DSS}	Zero Gate Voltage Drain Current	V _{GS} =0V, V _{DS} =-60V	---	---	-1	μ A
I _{GSS}	Gate-Source Leakage Current	V _{GS} = ± 20V, V _{DS} =0A	---	---	± 100	nA
On Characteristics						
V _{GS(th)}	GATE-Source Threshold Voltage	V _{GS} =V _{DS} , I _D =-250 μ A	-1	-2	-3	V
R _{DS(ON)}	Static Drain-Source On-Resistance	V _{GS} =-10V, I _D =-20A	---	16.5	20	m Ω
		V _{GS} =-4.5V, I _D =-20A	---	18.5	22	
		Dynamic Characteristics				
C _{iss}	Input Capacitance	V _{DS} =-20V, V _{GS} =0V, f=1MHz	---	4399	---	pF
C _{oss}	Output Capacitance		---	258	---	
C _{rss}	Reverse Transfer Capacitance		---	211	---	
Switching Characteristics						
t _{d(on)}	Turn-On Delay Time	V _{DD} =-30V, I _D =-20A, V _{GS} =-10V, R _G =1 Ω	---	23	---	ns
t _r	Rise Time		---	17	---	ns
t _{d(off)}	Turn-Off Delay Time		---	55	---	ns
t _f	Fall Time		---	29	---	ns
Q _g	Total Gate Charge		---	114	---	nC
Q _{gs}	Gate-Source Charge	V _{GS} =-10V, V _{DS} =-30V, I _D =-20A	---	27.3	---	nC
Q _{gd}	Gate-Drain “Miller” Charge		---	49	---	nC
Drain-Source Diode Characteristics						
V _{SD}	Drain Diode Forward		---	---	-1.2	V
I _S	Continuous Source Current	V _G =V _D =0V	---	---	-60	A
I _{SM}	Pulsed Source Current		---	---	-290	A
T _{rr}	Reverse Recovery Time	T J = 25 ° C, IF =-20A, di/dt =100A/μs	---	117	---	nS
Q _{rr}	Reverse Recovery Charge		---	420	---	nC

Notes:

1. Repetitive Rating: Pulse Width Limited by Maximum Junction Temperature
2. EAS condition: $T_J = 25^\circ\text{C}$, $V_{DD} = -25V$, $V_G = -5V$, $R_G = 25\Omega$, $L = 0.5mH$, I_{AS}
3. Pulse Test: Pulse Width $\leq 300\mu s$, Duty Cycle $\leq 0.5\%$

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P-Channel Enhancement Mosfet

Typical Characteristics

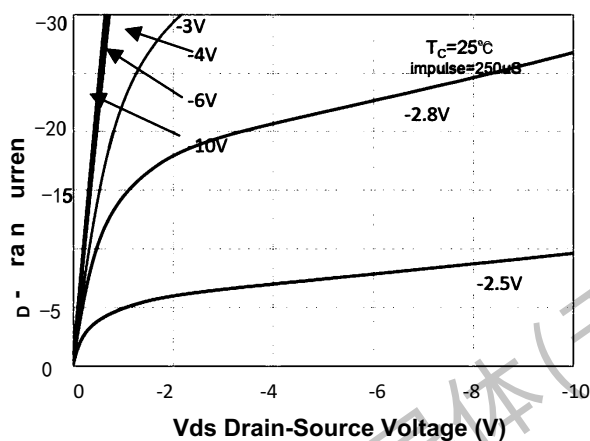


Figure 1. On-Region Characteristics

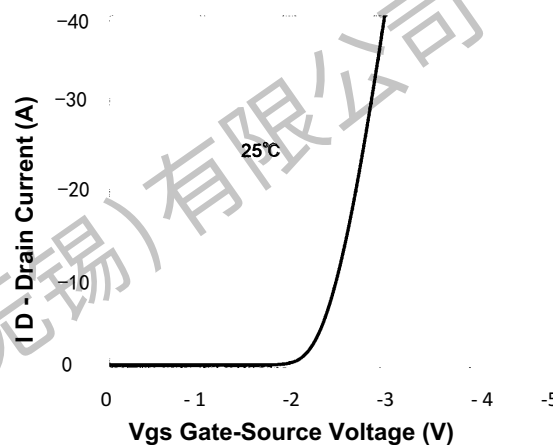


Figure 2. Transfer Characteristics

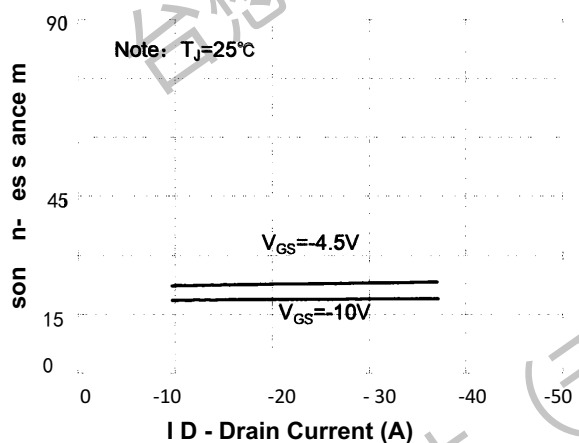


Figure 3. On-Resistance Variation vs Drain Current and Gate Voltage

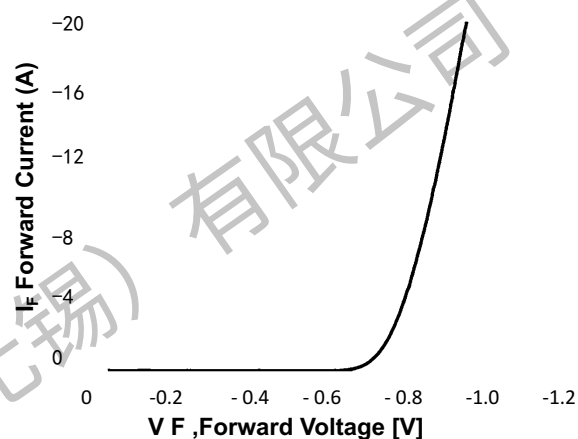


Figure 4. Body Diode Forward Voltage Variation with Source Current and Temperature



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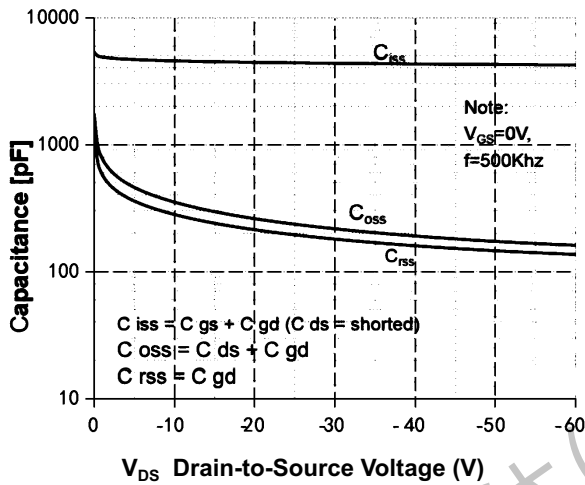


Figure 5. Capacitance Characteristics

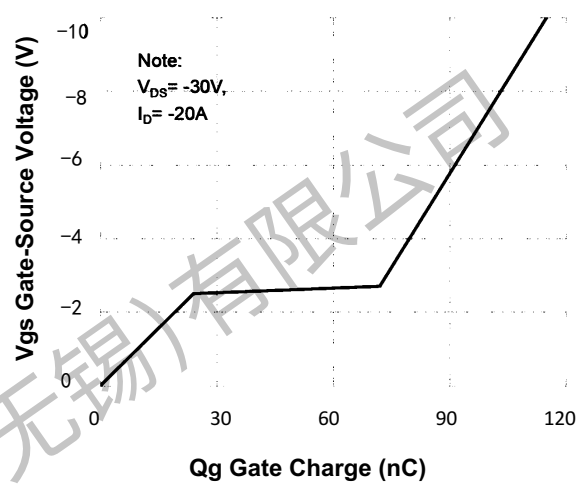


Figure 6. Gate Charge Characteristics

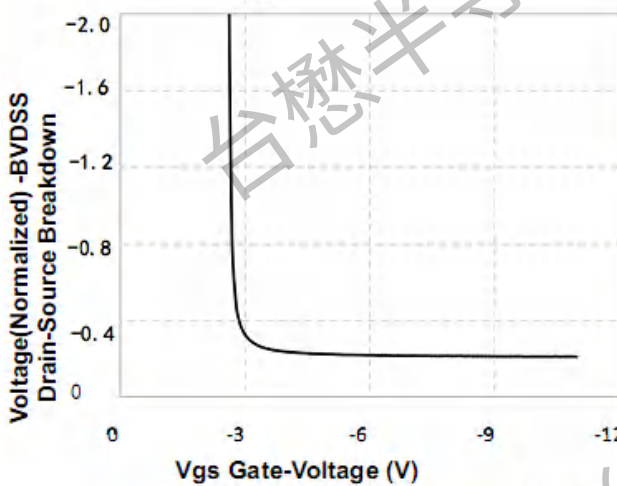


Figure 7. Breakdown Voltage Variation vs Gate-Voltage

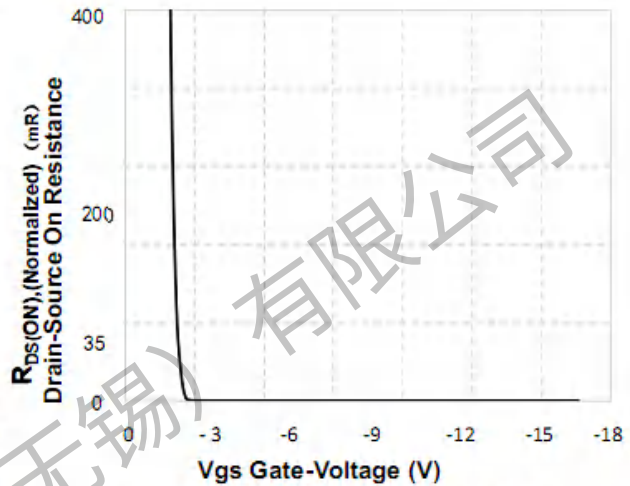


Figure 8. On-Resistance Variation vs Gate Voltage

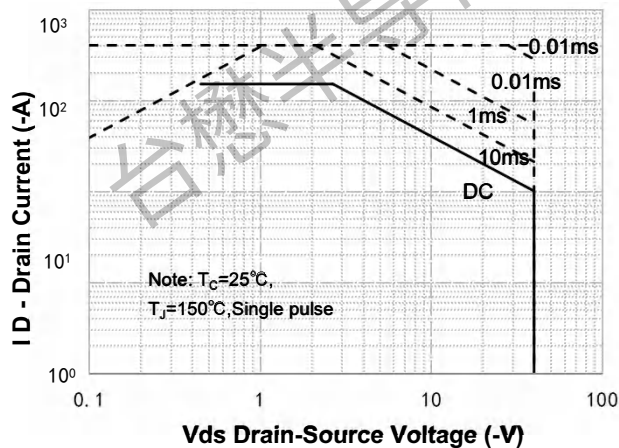


Figure 9. Maximum Safe Operating Area

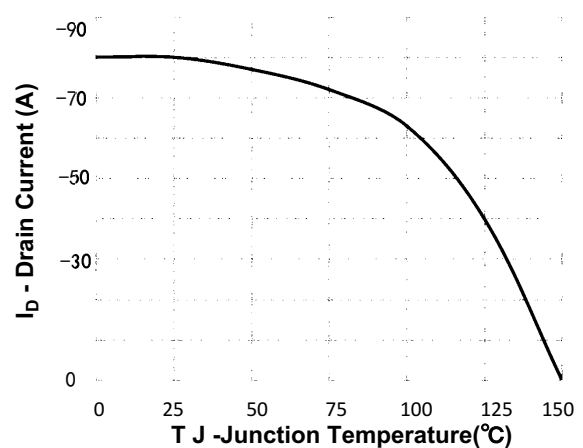


Figure 10. Maximum PContinuous Drain Current vs Case Temperature

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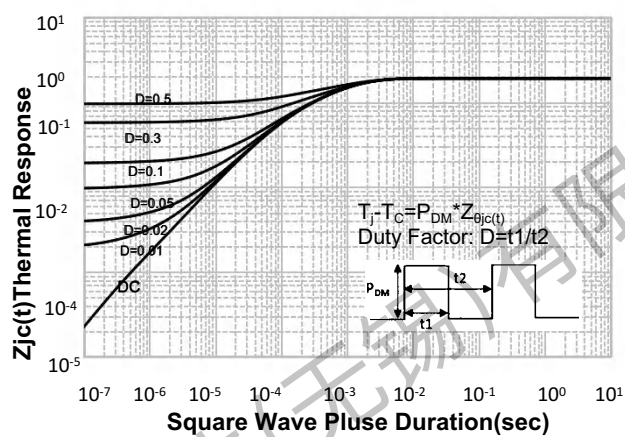
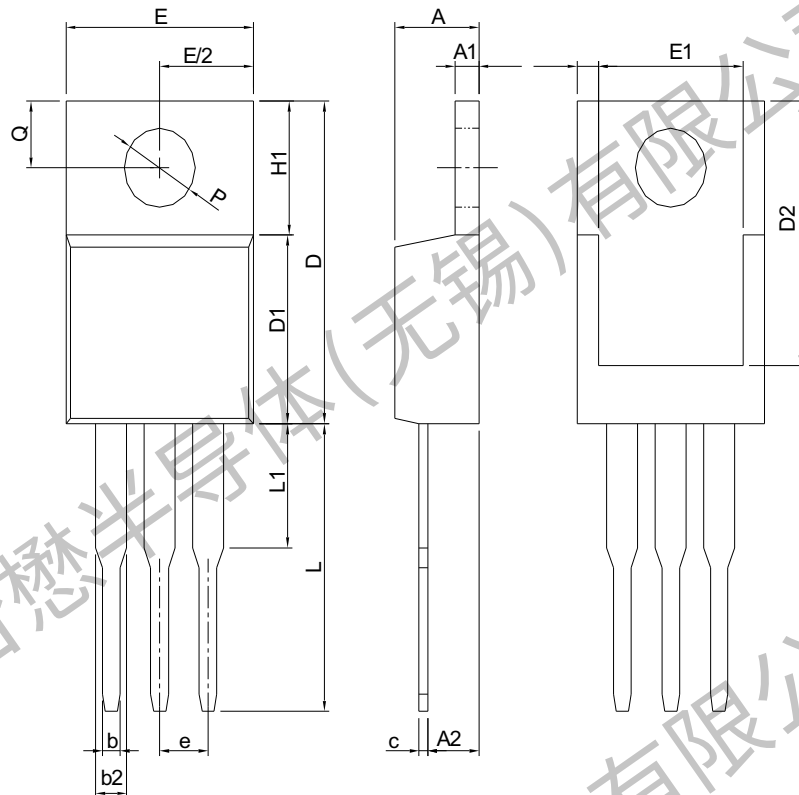


Figure 11. Transient Thermal Response Curve

TM60P06P

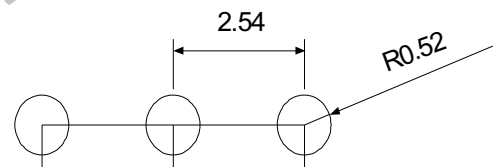
P-Channel Enhancement Mosfet

Package Mechanical Data: TO-220AB



SYMBOL	TO-220			
	MILLIMETERS		INCHES	
	MIN.	MAX.	MIN.	MAX.
A	3.56	4.83	0.140	0.190
A1	0.51	1.40	0.020	0.055
A2	2.03	2.92	0.080	0.115
b	0.38	1.02	0.015	0.040
b2	1.14	1.78	0.045	0.070
c	0.36	0.61	0.014	0.024
D	14.22	16.51	0.560	0.650
D1	8.38	9.02	0.330	0.355
D2	12.19	13.65	0.480	0.537
E	9.65	10.67	0.380	0.420
E1	6.86	8.89	0.270	0.350
e	2.54 BSC		0.100 BSC	
H1	5.84	6.86	0.230	0.270
L	12.70	14.73	0.500	0.580
L1	-	6.35	-	0.250
P	3.53	4.09	0.139	0.161
Q	2.54	3.43	0.100	0.135

RECOMMENDED LAND PATTERN

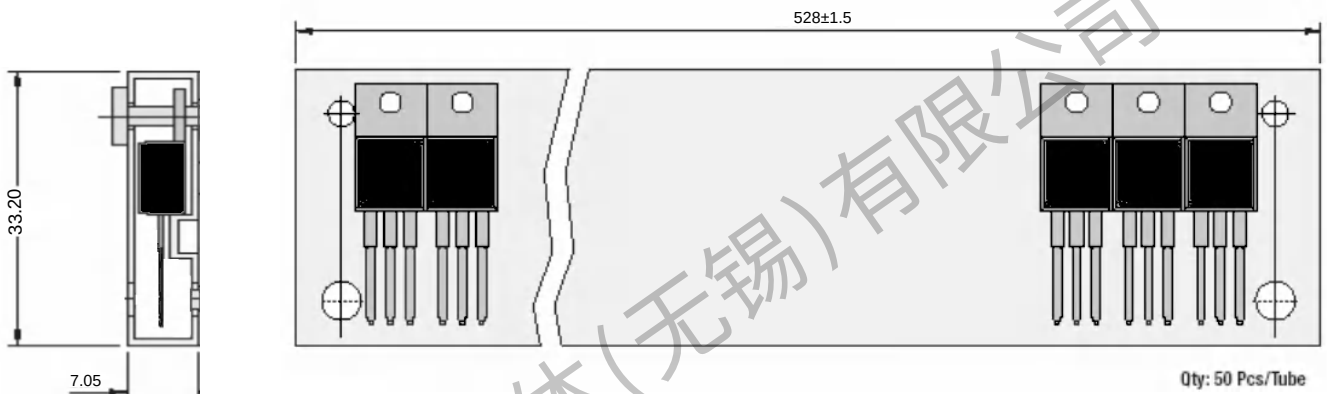


UNIT: mm

Note: Follow JEDEC TO-220 AB.

TM60P06P

P-Channel Enhancement Mosfet



All Dimensions are in mm

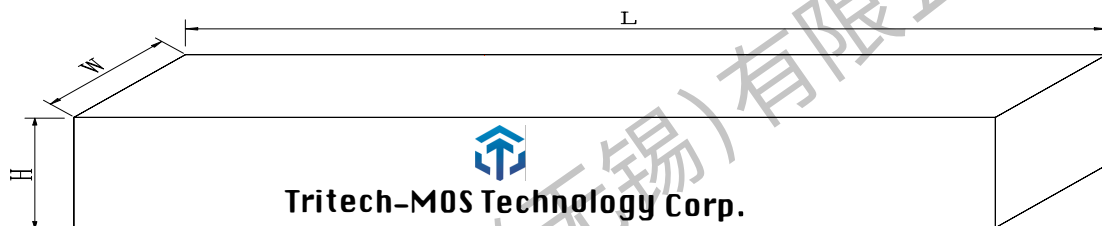
1.TO-220AB Packaging

Package	Packing Form	Quantity		
		Tube	Inner Box [kpcs]	Outbox [kpcs]
TO-220AB	Tube Tape	50	5	1

TM60P06P

P-Channel Enhancement Mosfet

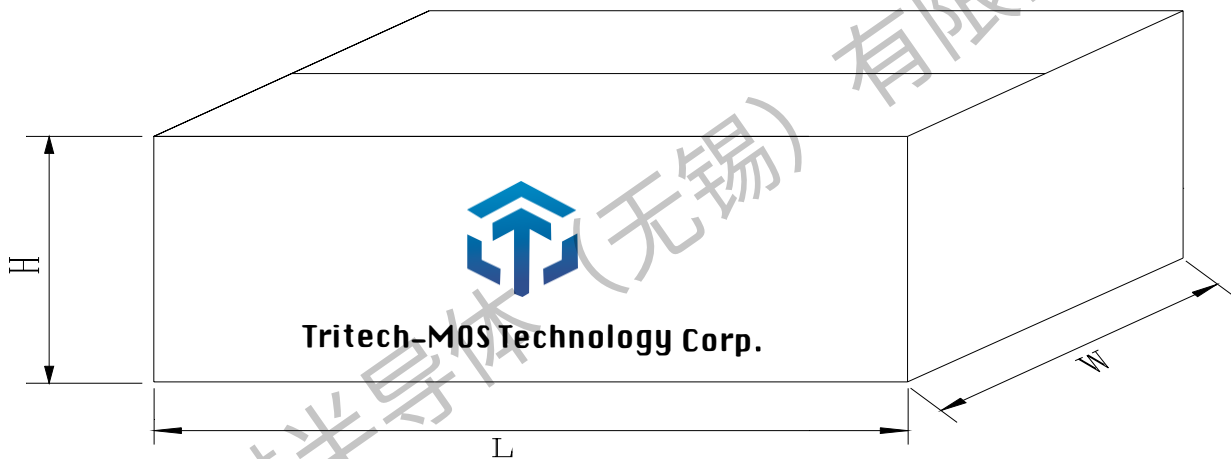
Inner Box



Dimension : 580 (L)×154(W) ×49(H) mm

Quantity : 50 ×20Ea = 1Kpcs

Outer Box



Dimension : 595(L)×285(W) ×185(H) mm

Quantity : 1K×5Ea = 5Kpcs

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Revision history:

Date	Rev	Description	Page
2023.07.10	23.07	Original	