

Product Summary

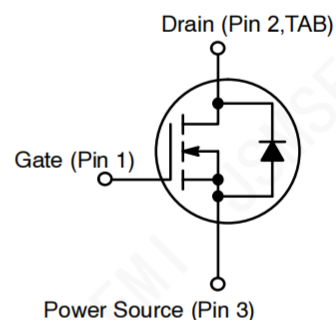
- V_{DS} 250V
- I_D 35A
- $R_{DS(ON)}$ (at $V_{GS}=10V$) < 94m Ω
- 100% EAS Tested
- 100% ∇V_{DS} Tested

General Description

- Vertical Double-diffused MOSFET technology
- Excellent package for heat dissipation
- High density cell design for low $R_{DS(ON)}$
- Moisture Sensitivity Level 1
- Epoxy Meets UL 94 V-0 Flammability Rating
- Halogen Free

Applications

- Power switching application
- Uninterruptible power supply
- DC-DC convertor
- Motor drivers



Absolute Maximum Ratings $T_C = 25^\circ\text{C}$, unless otherwise noted

Parameter	Symbol	Value	Unit
Drain-Source Voltage	V_{DSS}	250	V
Continuous Drain Current	I_D	35	A
Pulsed Drain Current (note2)	I_{DM}	140	A
Gate-Source Voltage	V_{GSS}	± 20	V
Single Pulse Avalanche Energy (note2)	E_{AS}	580	mJ
Avalanche Current (note1)	I_{AR}	39.5	V/ns
Repetitive Avalanche Energy (note1)	E_{AR}	368	mJ
Power Dissipation ($T_C = 25^\circ\text{C}$)	P_D	350	W
Operating Junction and Storage Temperature Range	T_J, T_{stg}	-55 to 175	$^\circ\text{C}$

Thermal Resistance

Parameter	Symbol	Value	Unit
Thermal Resistance, Junction-to-Case	R_{thJC}	0.5	$^\circ\text{C/W}$
Thermal Resistance, Junction-to-Ambient	R_{thJA}	62	

Specifications $T_J = 25^{\circ}\text{C}$, unless otherwise noted

Parameter	Symbol	Test Conditions	Value			Unit
			Min.	Typ.	Max.	
Static						
Drain-Source Breakdown Voltage	$V_{(BR)DSS}$	$V_{GS} = 0V, I_D = 250\mu A$	250	--	--	V
Zero Gate Voltage Drain Current	I_{DSS}	$V_{DS} = 250V, V_{GS} = 0V, T_J = 25^{\circ}C$	--	--	1	μA
Gate-Source Leakage	I_{GSS}	$V_{GS} = +20V, V_{DS}=0V$	--	--	100	nA
		$V_{GS}=-20V, V_{DS}=0V$	--	--	-100	
Gate-Source Threshold Voltage	$V_{GS(th)}$	$V_{DS} = V_{GS}, I_D = 250\mu A$	2.0	--	4.0	V
Drain-Source On-Resistance (Note3)	$R_{DS(on)}$	$V_{GS} = 10V, I_D = 20A$	--	77	94	m Ω
Dynamic						
Input Capacitance	C_{iss}	$V_{GS} = 0V,$ $V_{DS} = 25V,$ $f = 1.0MHz$	--	3238	--	pF
Output Capacitance	C_{oss}		--	557	--	
Reverse Transfer Capacitance	C_{rss}		--	190	--	
Total Gate Charge	Q_g	$V_{DD}=150V, I_D = 30A,$ $V_{GS} = 0 \text{ to } 10V$	--	124	--	nC
Gate-Source Charge	Q_{gs}		--	16	--	
Gate-Drain Charge	Q_{gd}		--	64	--	
Turn-on Delay Time	$t_{d(on)}$	$V_{DD} = 100V, I_D = 40A$ $V_{GS}= 10V R_G = 3\Omega$	--	19	--	ns
Turn-on Rise Time	t_r		--	65	--	
Turn-off Delay Time	$t_{d(off)}$		--	689	--	
Turn-off Fall Time	t_f		--	230	--	
Drain-Source Body Diode Characteristics						
Continuous Body Diode Current	I_S	$T_C = 25^{\circ}C$	--	--	35	A
Pulsed Diode Forward Current	I_{SM}		--	--	200	
Body Diode Voltage	V_{SD}	$T_J = 25^{\circ}C, I_{SD} = 25A, V_{GS} = 0V$	--	--	1.8	V
Reverse Recovery Time	t_{rr}	$V_{GS} = 0V, I_S = 25A,$ $di_F/dt = 100A/\mu s$	--	180	--	ns
Reverse Recovery Charge	Q_{rr}		--	2.04	--	μC

- Notes**
1. Repetitive Rating: Pulse width limited by maximum junction temperature
 2. $I_{AS} = 30A, V_{DD} = 30V, R_G = 25\Omega$, Starting $T_J = 25^{\circ}\text{C}$
 3. Pulse Test: Pulse width $\leq 300\mu s$, Duty Cycle $\leq 1\%$

Ordering Information

Order number	Package	Marking	Operation Temperature Range	MSL Grade	Ship, Quantity	Green
FDP33N25-JSM	TO-220-3	FDP33N25	-55 to 175 $^{\circ}\text{C}$	1	TUBE, 1000	RoHS

Typical Characteristics $T_J = 25^\circ\text{C}$, unless otherwise noted

Figure 1. Output Characteristics ($T_J = 25^\circ\text{C}$)

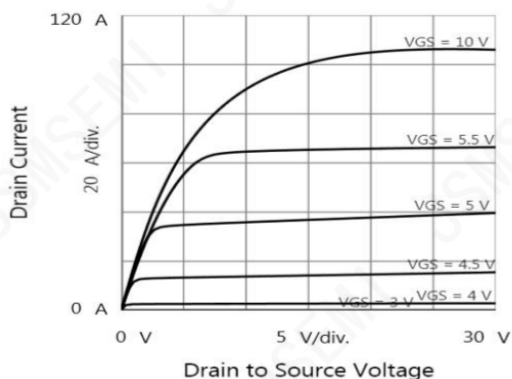


Figure 2. Transfer Characteristics

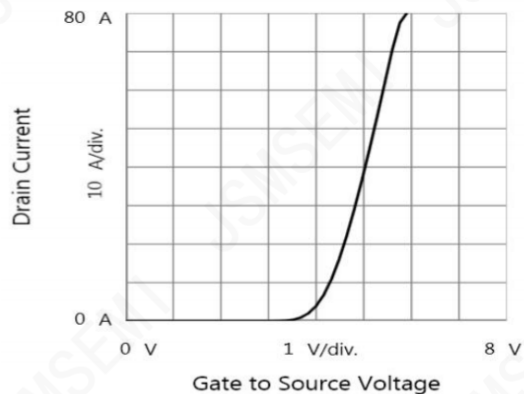


Figure3. Maximum Continuous Drain Current vs Case Temperature

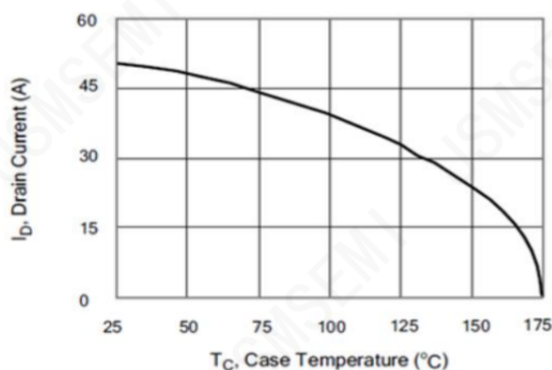


Figure 4. Drain to Source Voltage vs. Gate to Source Voltage

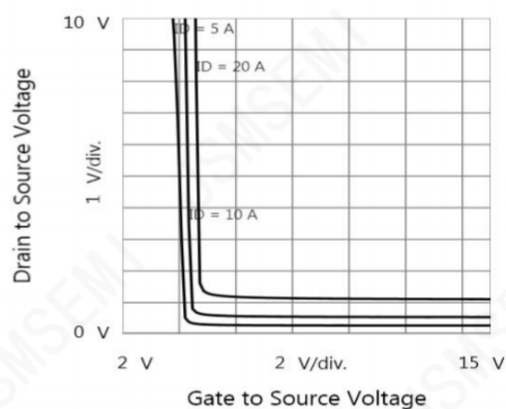


Figure 5 . Typical Breakdown Voltage vs Junction Temperature

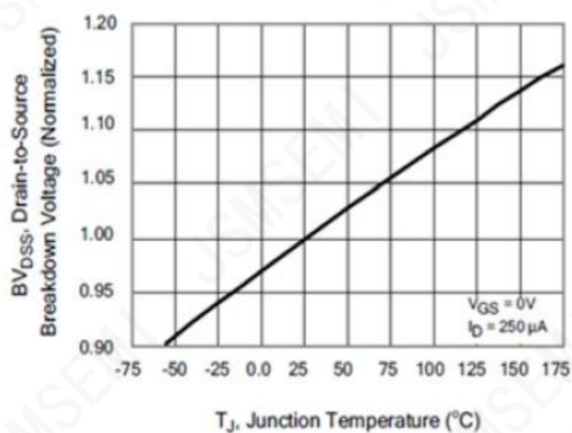
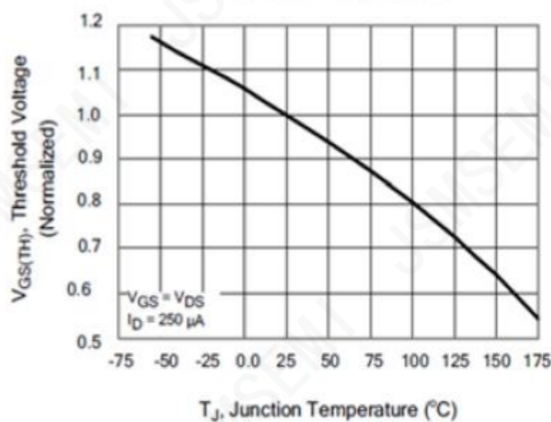


Figure 6 . Typical Threshold Voltage vs Junction Temperature



Typical Characteristics $T_J = 25^\circ\text{C}$, unless otherwise noted

Figure 7. Capacitance

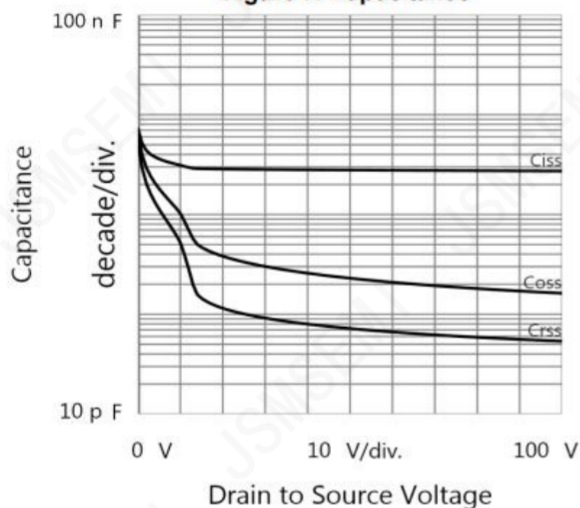


Figure 8. Gate Charge

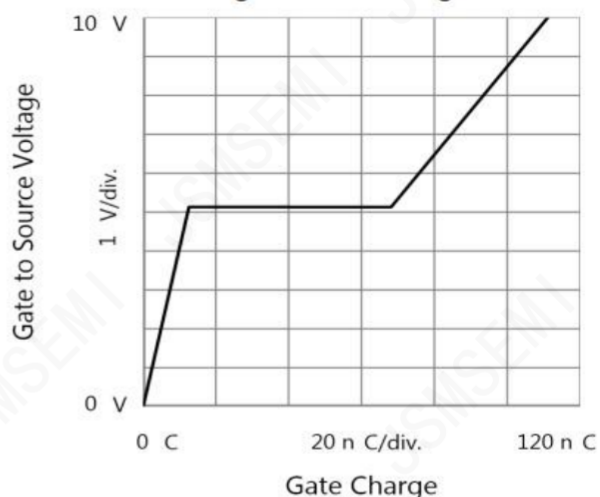


Figure 9. Transient Thermal Impedance
TO-247, TO-3P

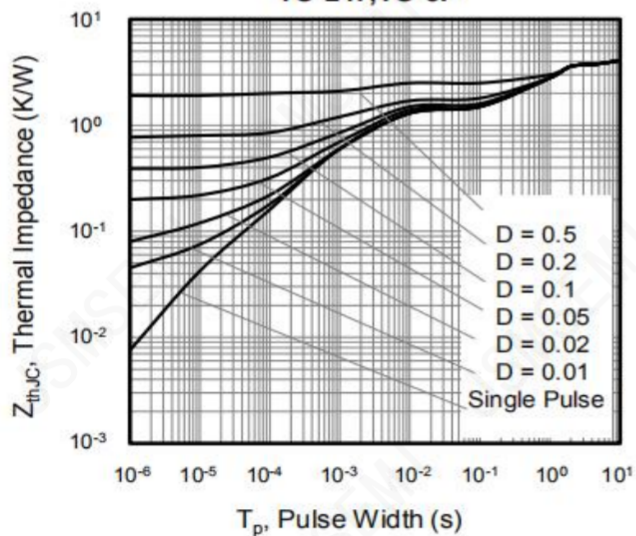


Figure 10. Maximum Forward Bias Safe
Operating Area

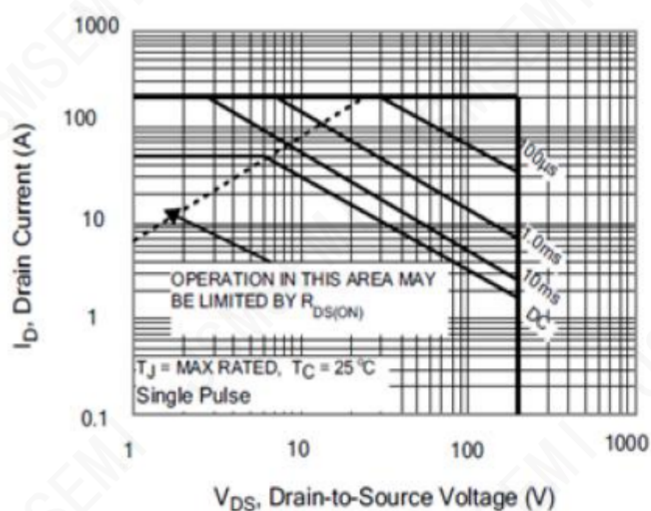


Figure A: Gate Charge Test Circuit and Waveform

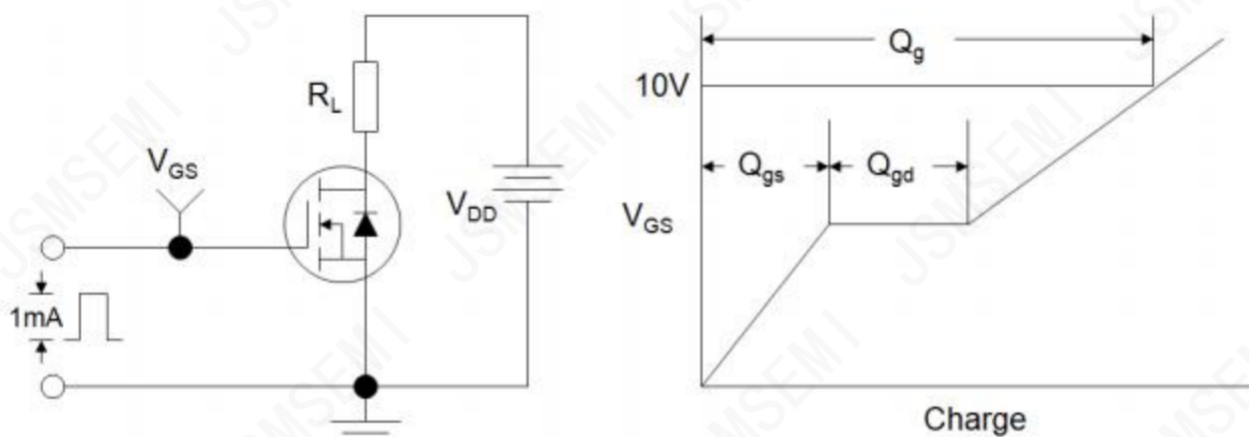


Figure B: Resistive Switching Test Circuit and Waveform

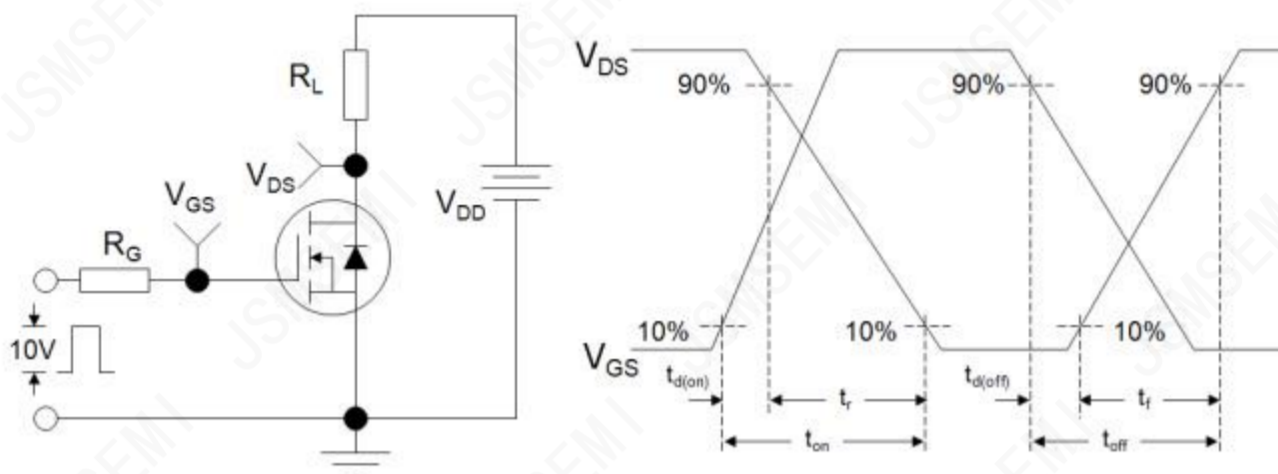
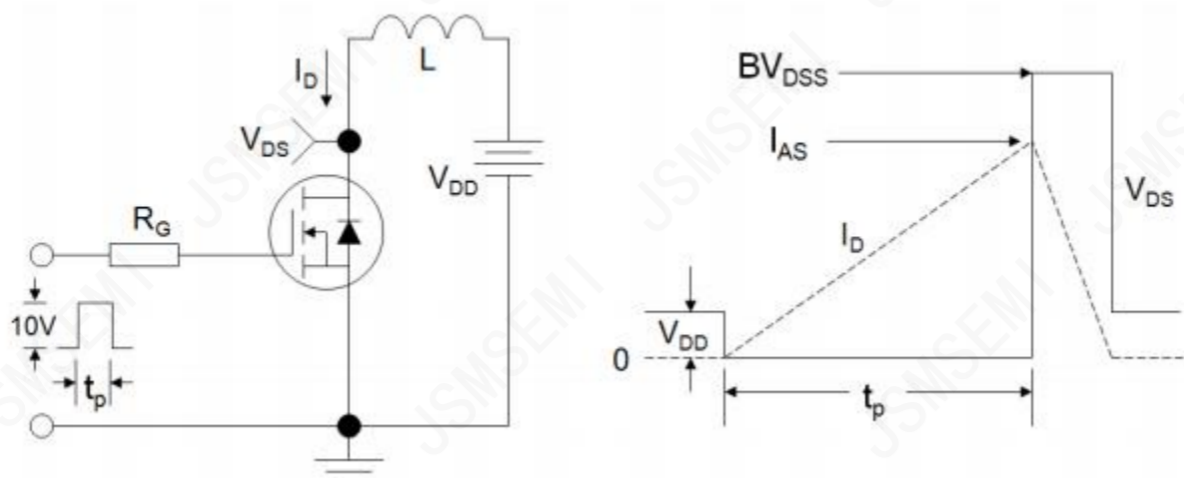
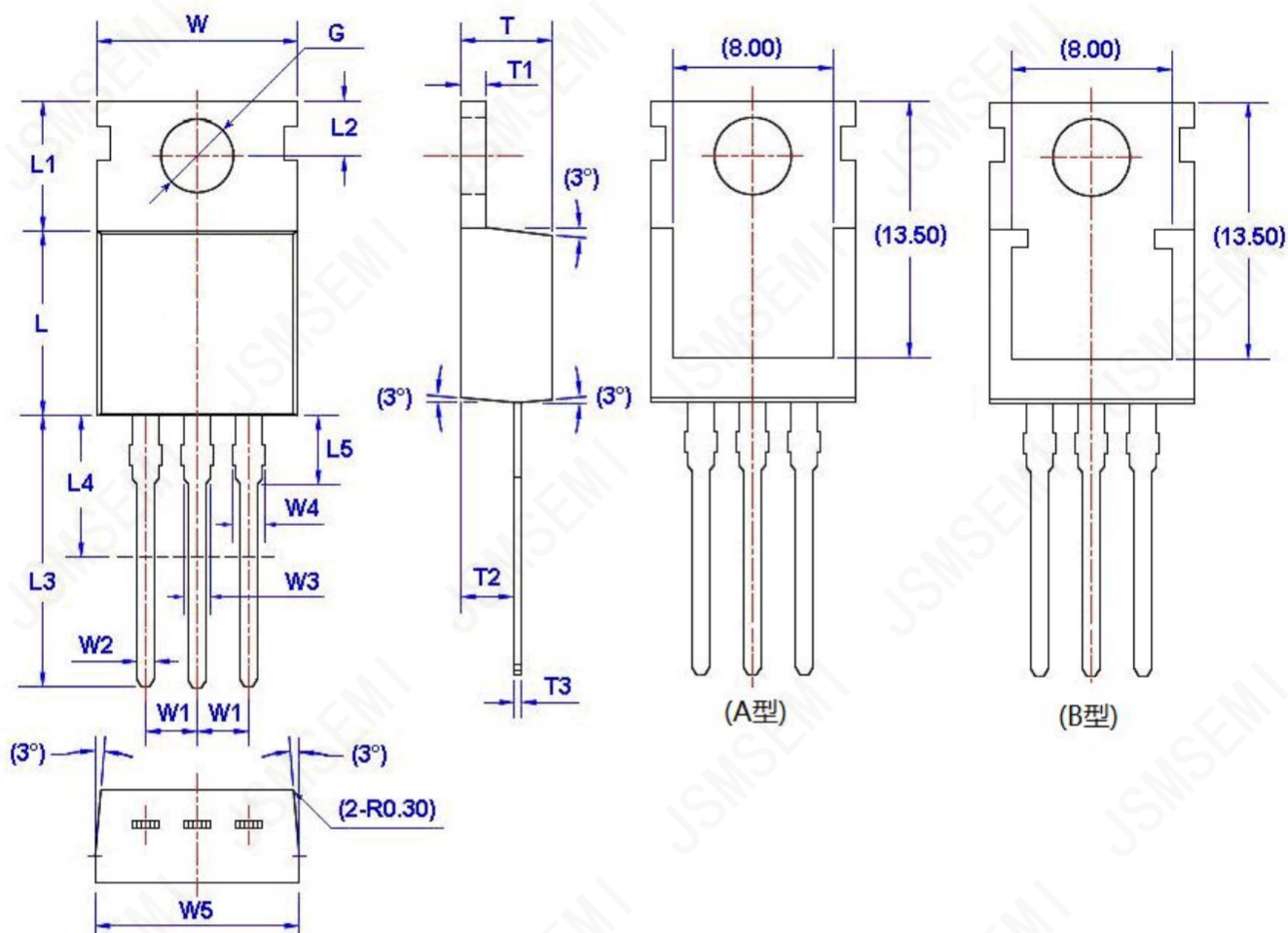


Figure C: Unclamped Inductive Switching Test Circuit and Waveform



Package Information

TO-220-3



Unit: mm

Symbol	Size		Symbol	Size		Symbol	Size		Symbol	Size	
	Min	Max		Min	Max		Min	Max		Min	Max
W	9.66	10.28	W5	9.80	10.20	L4**	6.20	6.60	T3	0.45	0.60
W1	2.54 (TYP)		L	9.00	9.40	L5	2.79	3.30	G(Φ)	3.50	3.70
W2	0.70	0.95	L1	6.40	6.80	T	4.30	4.70			
W3	1.17	1.37	L2	2.70	2.90	T1	1.15	1.40			
W4*	1.32	1.72	L3	12.70	14.27	T2	2.20	2.60			

Revision History

Rev.	Change	Date
V1.0	Initial version	3/11/2019

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