

## FEATURES

- | 100% EAS Guaranteed

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- | Green Device Available

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- | Super Low Gate Charge

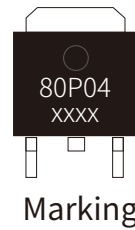
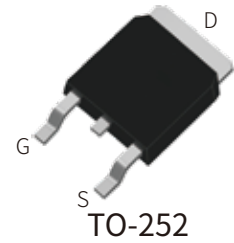
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- | Excellent CdV/dt effect decline

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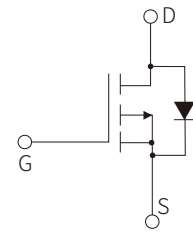
- | Advanced high cell density Trench technology

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## APPROVALS

<b>RoHS</b>	Compliance with 2011/65/EU
<b>HF</b>	Compliance with IEC61249-2-21:2003



Schematic Symbol

## ABSOLUTE MAXIMUM RATINGS ( $T_A=25^{\circ}\text{C}$ )

Parameter	Symbol	Value	Unit	
Drain-Source Voltage	$V_{DS}$	-40	V	
Gate-Source Voltage	$V_{GS}$	$\pm 20$	V	
Continuous Drain Current	$I_D$	$T_c=25^{\circ}\text{C}$	-80	A
		$T_c=100^{\circ}\text{C}$	-50.6	A
Pulsed Drain Current <sup>1</sup>	$I_{DM}$	-320	A	
Total Power Dissipation $T_c=25^{\circ}\text{C}$	$P_D$	81.16	W	
Single Pulse Avalanche Energy <sup>2</sup>	EAS	101.25	mJ	
Thermal Resistance from Junction-to-Ambient <sup>3</sup>	$R_{\theta JA}$	54	$^{\circ}\text{C}/\text{W}$	
Thermal Resistance from Junction-Case	$R_{\theta JC}$	1.54	$^{\circ}\text{C}/\text{W}$	
Junction and Storage Temperature Range	$T_J, T_{STG}$	-55 to +150	$^{\circ}\text{C}$	

## ELECTRICAL CHARACTERISTICS (T<sub>A</sub>=25°C)

Parameter	Symbol	Test Conditions	Min.	Typ.	Max.	Unit
<b>Static Characteristics</b>						
Drain-Source Breakdown Voltage	V <sub>(BR)DSS</sub>	V <sub>GS</sub> =0V, I <sub>D</sub> =-250μA	-40			V
Zero Gate Voltage Drain Current	I <sub>DSS</sub>	V <sub>DS</sub> =-40V, V <sub>GS</sub> =0V, T <sub>J</sub> =25°C			-1	μA
		V <sub>DS</sub> =-40V, V <sub>GS</sub> =0V, T <sub>J</sub> =100°C			-100	μA
Gate to Body Leakage Current	I <sub>GSS</sub>	V <sub>GS</sub> =±20V, V <sub>DS</sub> =0V			±100	nA
Gate Threshold Voltage	V <sub>GS(th)</sub>	V <sub>DS</sub> =V <sub>GS</sub> , I <sub>D</sub> =-250μA	-1.0	-1.6	-2.5	V
Drain-Source on-Resistance <sup>4</sup>	R <sub>DS(on)</sub>	V <sub>GS</sub> =-10V, I <sub>D</sub> =-20A		6.4	8.2	mΩ
		V <sub>GS</sub> =-4.5V, I <sub>D</sub> =-15A		8.2	11	mΩ
Forward Transconductance <sup>4</sup>	g <sub>fs</sub>	V <sub>DS</sub> =-10V, I <sub>D</sub> =-20A		104		S
<b>Dynamic Characteristics<sup>5</sup></b>						
Input capacitance	C <sub>iss</sub>	V <sub>GS</sub> =0V, V <sub>DS</sub> =-20V, f = 1MHz		5295		pF
Output capacitance	C <sub>oss</sub>			430		pF
Reverse transfer capacitance	C <sub>rss</sub>			385		pF
Gate Resistance	R <sub>g</sub>	f = 1MHz		4.3		Ω
<b>Switching Characteristics<sup>5</sup></b>						
Total Gate Charge	Q <sub>g</sub>	V <sub>DS</sub> =-20V, V <sub>GS</sub> =-10V, I <sub>D</sub> =-20A		110		nC
Gate-Source Charge	Q <sub>gs</sub>			12.5		nC
Gate-Drain Charge	Q <sub>gd</sub>			23		nC
Turn-on Delay Time	t <sub>d(on)</sub>	V <sub>DD</sub> =-20V, V <sub>GS</sub> =-10V R <sub>G</sub> = 3Ω, I <sub>D</sub> =-20A		16.8		nS
Turn-on Rise Time	t <sub>r</sub>			10		nS
Turn-Off Delay Time	t <sub>d(off)</sub>			65		nS
Turn-Off Fall Time	t <sub>f</sub>			17		nS
Body Diode Reverse Recovery Time	t <sub>rr</sub>	I <sub>F</sub> =-20A, di/dt =100A/μs		42		ns
Body Diode Reverse Recovery Charge	Q <sub>rr</sub>			29		nC
<b>Drain- Source Body Diode Characteristics</b>						
Diode Forward Voltage <sup>4</sup>	V <sub>SD</sub>	V <sub>GS</sub> =0V, I <sub>S</sub> =-20A			-1.2	V
Continuous Source Current T <sub>C</sub> =25°C	I <sub>S</sub>				-80	A

**Notes:**

1. Repetitive rating, pulse width limited by junction temperature T<sub>J(MAX)</sub>=150°C.
2. The EAS data shows Max. rating. The test condition is V<sub>DD</sub>=-30V, V<sub>GS</sub>=-10V, L= 0.1mH, I<sub>AS</sub>= -45A.
3. The data tested by surface mounted on a 1 inch2 FR-4 board with 20Z copper, The value in any given application depends on the user's specific board design.
4. The data tested by pulsed, pulse width ≤ 300μs, duty cycle ≤ 2%.
5. This value is guaranteed by design hence it is not included in the production test.

# CHARACTERISTIC CURVES

Figure 1: Typical Transfer Characteristics

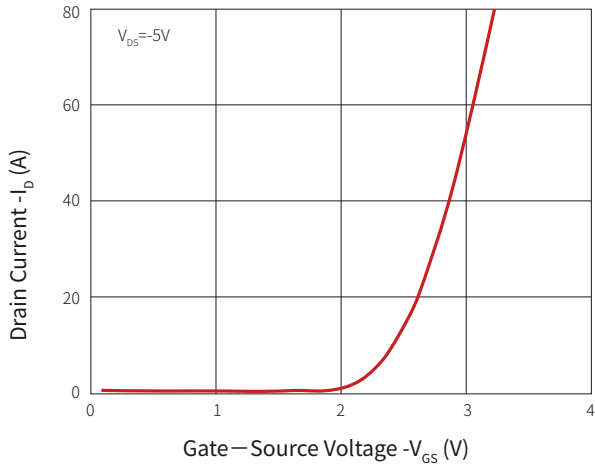


Figure 2: Forward Characteristics of Reverse

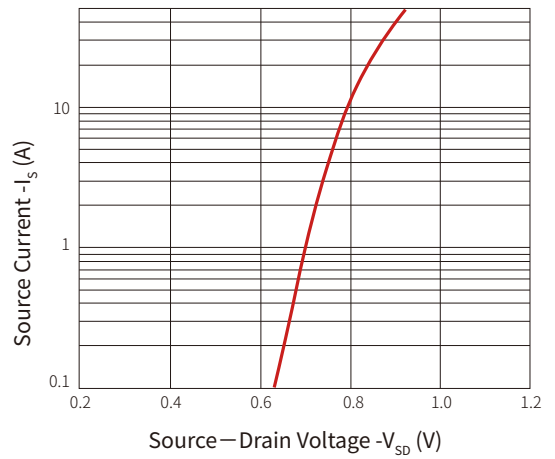


Figure 3:  $R_{DS(ON)}$  vs  $V_{GS}$

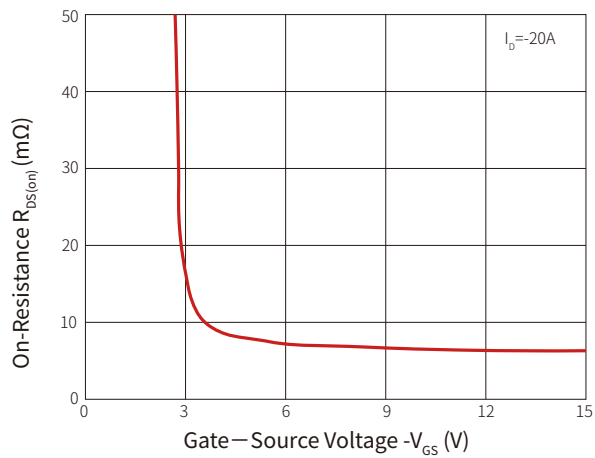


Figure 4:  $R_{DS(ON)}$  vs  $I_D$

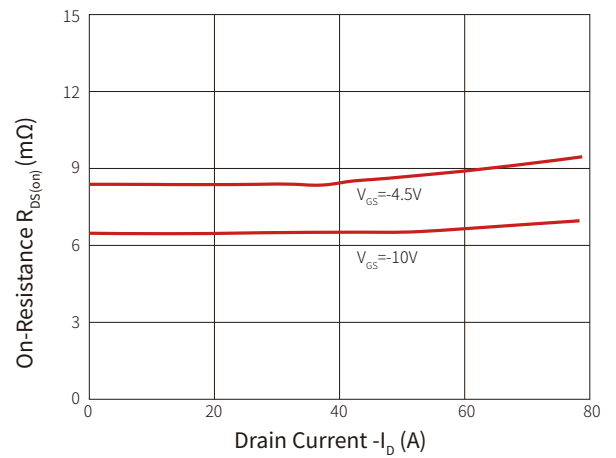


Figure 5: Normalized  $R_{DS(on)}$  vs. Temperature

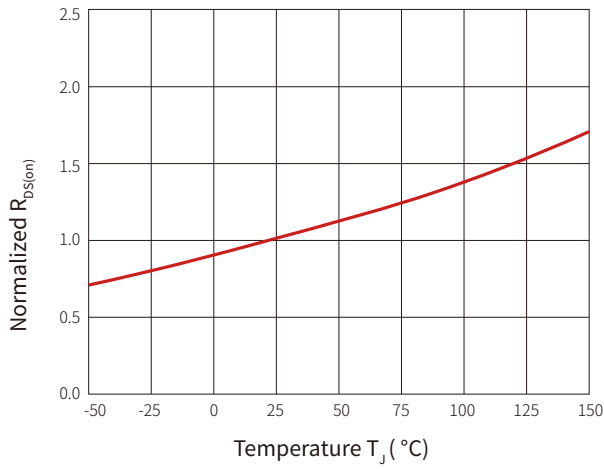


Figure 6: Gate Charge Characteristics

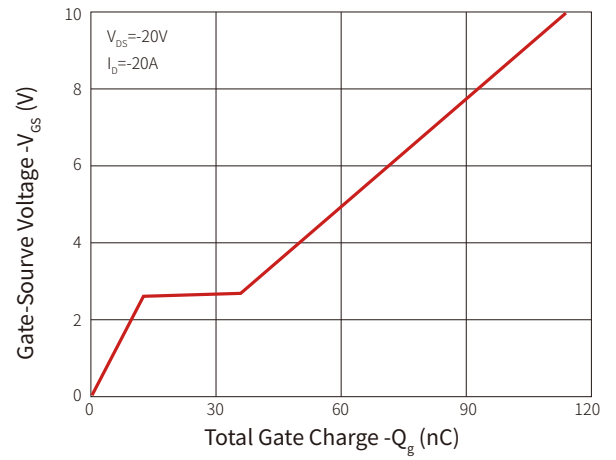


Figure 7: Power Dissipation

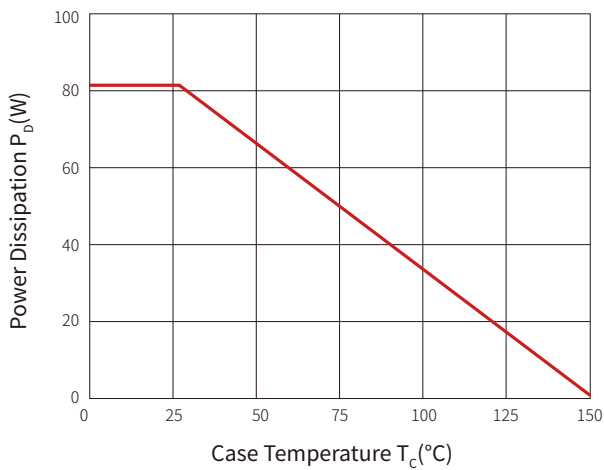


Figure 8: Normalized Maximum Transient Thermal Impedance

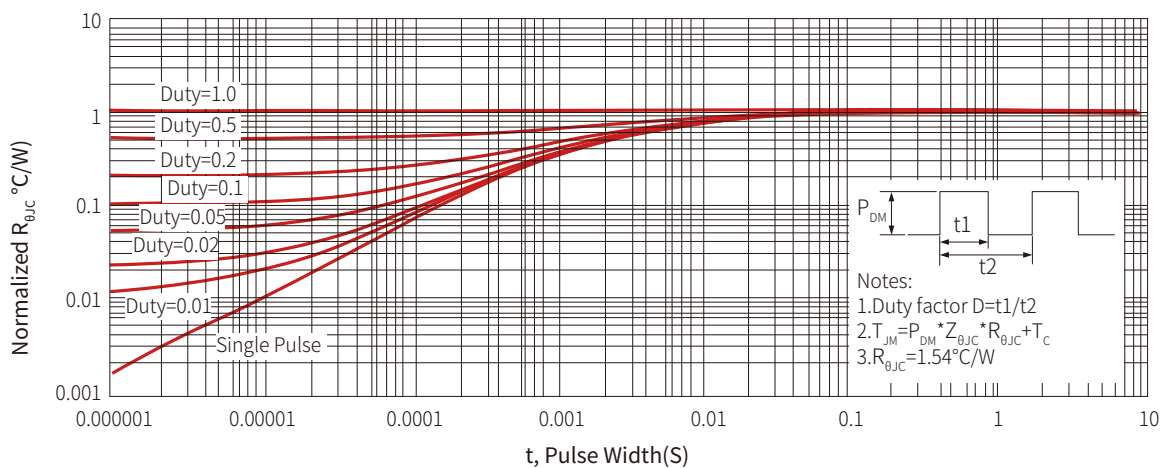


Figure 9: Gate Charge Test Circuit & Waveforms

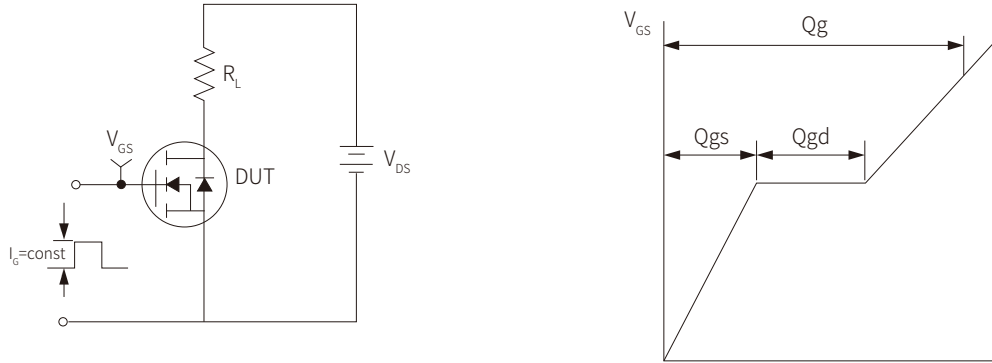


Figure 10: Switching Test Circuit & Waveforms

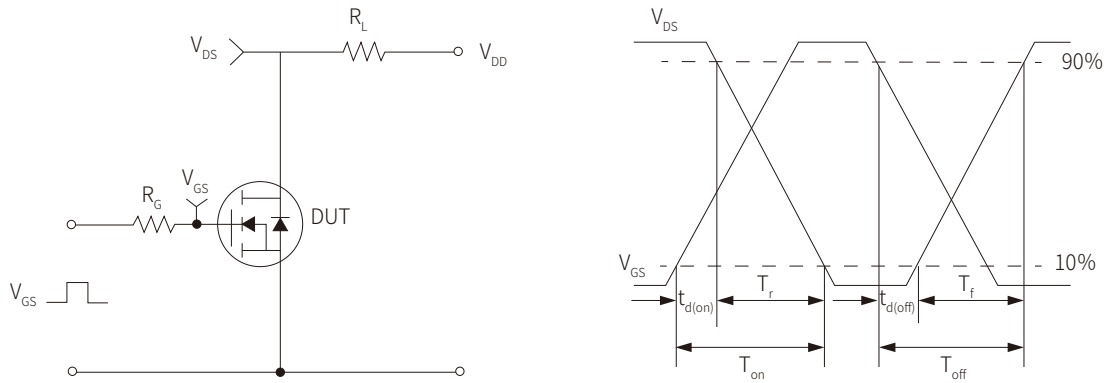
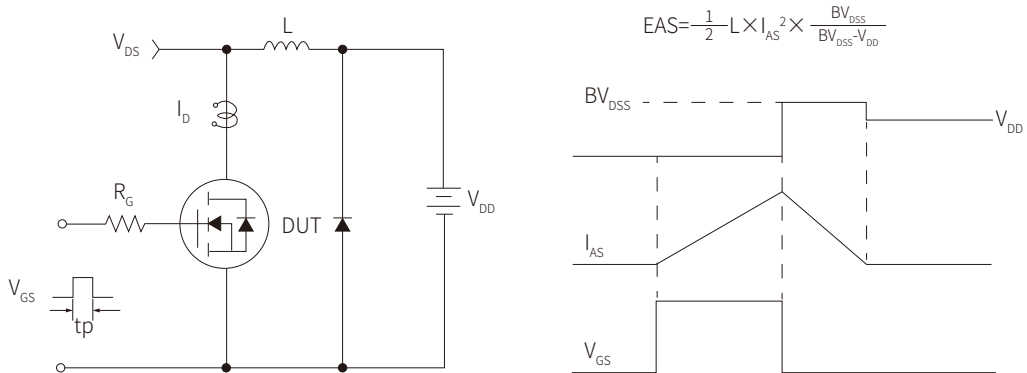
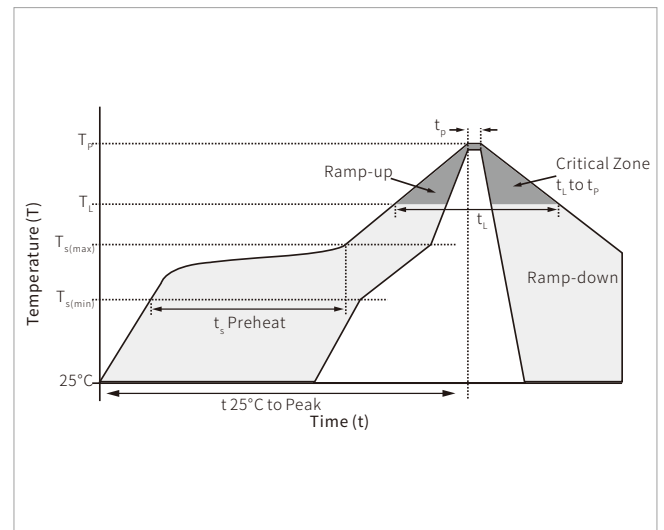


Figure 11: Unclamped Inductive Switching Circuit & Waveforms

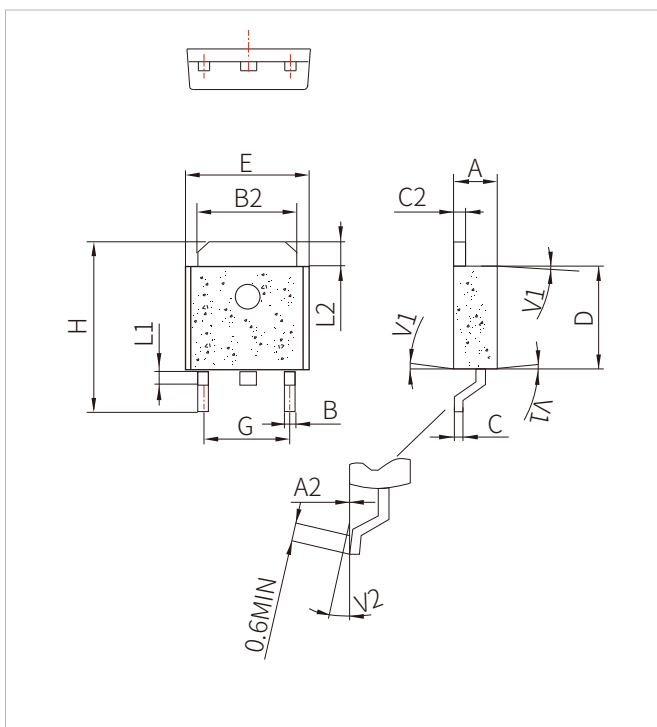


## SOLDERING PARAMETERS

Reflow Condition		Lead-free assembly
Pre Heat	Temperature Max ( $T_{s(min)}$ )	150°C
	Temperature Max ( $T_{s(max)}$ )	200°C
	Time (min to max) ( $t_s$ )	60 – 180 secs
Average ramp up rate (Liquidus Temp ( $T_L$ ) to peak)		3°C/second max
$T_{s(max)}$ to $T_L$ - Ramp-up Rate		3°C/second max
Reflow	Temperature ( $T_L$ ) (Liquidus)	217°C
	Time (min to max) ( $t_L$ )	60 – 150 seconds
Peak Temperature ( $T_p$ )		260°C
Time within 5°C of actual peak Temperature ( $t_p$ )		20 – 40 seconds
Ramp-down Rate		6°C/second max
Time 25°C to peak Temperature ( $T_p$ )		8 minutes max.
Do not exceed		260°C



## TO-252 PACKAGE MECHANICAL DATA



Ref.	Dimensions					
	Millimeters			Inches		
	Min.	Typ.	Max.	Min.	Typ.	Max.
A	2.10		2.50	0.083		0.098
A2	0.03		0.23	0.001		0.009
B	0.55		0.65	0.022		0.026
B2	5.10		5.40	0.200		0.213
C	0.45		0.62	0.018		0.024
C2	0.48		0.62	0.019		0.024
D	6.00		6.20	0.236		0.244
E	6.40		6.80	0.252		0.268
G	4.40		4.70	0.173	0.1	0.185
H	9.35		10.7	0.368		0.421
L1	1.30		1.70	0.051	0.143	0.067
L2	1.37		1.50	0.054		0.059
V1		4°			0.130	
V2	0°		8°	0°		8°

## ORDERING INFORMATION

Part Number	Component Package	QTY/Reel	Reel Size
SPM80P04D	TO-252	2500PCS	13"

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